



Sri Lanka Institute of Information Technology

Student and Instructor Information Management System

Project Report

Application Frameworks Project 2019

Project ID: **WD-17 – Tech Gang**

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Submitted to:

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Name of the supervisor

24th June 2019
Date of submission

Declaration

We declare that this project report or part of it was not a copy of a document done by any organization, university any other institute or a previous student project group at SLIIT and was not copied from the Internet or other sources.

Project Details

Project Title	Student and Instructor Information System
Project ID	WD-17 – Tech Gang

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Abstract

The technological advancements have influenced the society to take a leap towards success. Every technological reform is a small step towards advancement and progress of mankind. Development in information technologies have also been impacting upon educational institutes. This documentation is a final technical report document for a Student and Instructor Information System for universities after the complete development of the full system which depicts the goals achieved from the completed information management system. As mentioned earlier the prevailing manual logbook-based system used by universities, caused many inconveniences regarding the day to day operations of the university. Object Oriented Approach was given priority throughout the project. Accessing the project work within the above-mentioned scope made the project workload a bit easier and hazardless and the system evaluation was done weighting equally allocating the best set of people with accordance to their specific criteria. The solution or the results abbreviated from the above evaluation has a great impact on the future or further maintenance of the system. So, this completed computerized system would play a major role in the day to day operations of universities with no doubt.

Acknowledgement

We would be grateful to express our gratitude and appreciation to our Head of Software Engineering Department, Mr. Nuwan Kodagoda, the visiting lecturers of Application Frameworks module Mr. Kushira Godellawaththe and Mr. Dhanushka Jayamaha and also the other lecturers and instructors who conducted lectures, labs and evaluations, for guiding us within the perfect path by providing us with plenty of important and valuable instructions and suggestions from the very beginning of the project to the end of it. Also, I would like to express my heartiest gratitude to our group members who worked on this project in order to make it successful. All the people who are mentioned above were also a key factor for the success of this project and to make this a reality.

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1. Introduction

Our project is to build a web application for universities in common, that serves as a Student and Instructor information system. This will support many of the activities and functionalities in universities including Management of system admins, instructors, students, courses, emails, notifications and many others. Also, this system includes assigning of instructors to courses, enrollment of students for courses with proper validation, creation of assignments and exams for courses with due dates with uploading and downloading facilities. The system is secured and cannot be accessed without proper authentication. This is handled by proper validation mechanisms via the three user roles admin, instructor and students.

1.1 Problem Statement

In some of the universities in Sri Lanka, the current student and instructor information management is maintained as a manual system. Here, some of the problems faced by such universities will be described under selected functions and as general problems we have analyzed in building our system.

1.1.1 Student Management

General Problem is the inefficient rate of manually mandating a system or accessing manual student system is widely known due to the time consumed of manually recording of the transactions being done, security of data is at risk, and inaccuracy of data. The instructors, administrator considered the problems encountered in using manual student system. Specific problems are time consuming; the record of information is done manually in such a way that employee writes down the details of different information every time a document of student information that is needed to be edited and takes too much time.

1.1.2 Admin/Instructor Management

Some of the major functionalities here are admin and instructor registration with proper management. General Problem is the inefficient rate of manually mandating a system or accessing manual staff system is widely known due to the time consumed of manually recording of the transactions being done, security of data is at risk, and inaccuracy of data. Also, there is no way to notify and confirm them when they are added to the system. Creation of courses and assigning instructors to them are also cannot be notified to the relevant parties when a manual system is used.

1.1.3 Exam/Assignment Management

Some of the major functionalities here are creating assignments and exams with due dates, notifying students on these, management of due dates, uploading files for assignments and exams before the due date, viewing these files and entering marks for the assignments and exams, and notifying students on these markings. With a manual system, notifications cannot be given automatically, and it takes a lot of time to complete the above-mentioned functionalities. Also, some other problems are less accuracy, requires more manual work, paperwork is required, previous records are not stored and resembles like a complex problem while allocating faculty to different rooms.

1.1.4 Other General Problems

- Data is duplicated in vast amount and the loss of data and the use of inaccurate data is among problems too.
- Since the system is manual there is no way of backing up the data written down.
- And the time wasted in searching for a record is very high.
- Generation of reports also takes a lot of time; the accuracy of the reports is not excellent and is costly either.
- Inconsistency in data entry, room for errors, mis keying information, large ongoing staff training cost, reduction in sharing information and lack of security can be indicated as other issues in a manual student and instructor information management system.
- Data is not always reliable as it is handwritten and some human errors might have occurred, for example wrong telephone number.
- Lots of Manual labor is required for record keeping.
- Too much paper wastage. Paper takes up a massive amount of room in the site.
- Poor Data Storage - All the data is stored in filing cabinets. Data could be misplaced due to human error. Data could be stolen very easily.
- Unavailability of information and slow retrieval of data because the related information is stored in different parts and takes a long time to retrieve data.

As a solution for the above problems, we would like to introduce a fully automated student and instructor information management system that helps in management and administration activities. Which will also increase the accuracy of reports and the decision making of the administration from the data retrieved from the system. A system with divided modules for main functions will be proposed. The modules will handle necessary processing and information management in a fully automated way. Instead of paper - based processes, our information management system will automate academic processes to save time and reduce staff workload. Instead of standing for hours in the queue to pay fees and for registrations, simplify registration and fee collections with online forms, with the ability to send automatic notifications, alerts and reminders via email, SMS alerts and push notifications from mobile devices will be introduced. Instructors are struggling to monitor student's activities including assignments, etc.

1.2 Product Scope

We are going to implement a Student and Instructor Information Management System for universities in common. Our project is divided among three main user roles which includes admin, instructor and students. The functions owed to each user role are handled by a member of the group. Each function covers a different aspect of the system and some functions are interconnected with other functions and sub functions.

1.2.1 Admin

- ✓ Create other admins and instructors
- ✓ Once an instructor is created, notify him/her about it via email
- ✓ Create courses and add instructors to course
- ✓ Once an instructor is added to a newly added course, notify him/her about them via email when logged into the system

1.2.2 Instructors

- ✓ Create assignments and exams for a course with due dates
- ✓ Notify the students about exams and assignments, once they are created
- ✓ Edit due dates (only to a later date than the original one)
- ✓ View the assignment and exam files and enter marks for them and notify students about them

1.2.3 Students

- ✓ Sign into the system
- ✓ After instructor accept the course, join the course
- ✓ Upload files for assignments and exams before the due date

1.3Project Report Structure

This final technical report regarding the student and instructor information management system project done for universities in common, is organized according to the order of the structure mentioned below. The next section is containing information regarding the methodology. It describes how the study was conducted by the project group. It comprises of four sub sections as requirements and analysis, design, implementation and testing. Requirement analysis is a detailed and specific requirement of the project. It contains all the functional and nonfunctional requirements of the system. Also, the information flow of the system is described using a use case diagram for more understandability.

Design describes all the methods and techniques used to design the system and it is mostly explained with the aid of diagrams. It comprises of three sub sections as describing the system, describing the database of the system and to show out the product. Here, a class diagram is used to describe the system and an ER diagram for the whole database design is used to describe the internal functionality of the system and it describes about the kind of database and the tables designed briefly. At the user manual, some of the important user interface designs are included in order to show out the product more comprehensively. Implementation explains all the major module structures comprehensively including the necessary implementation details. Choice of DBMS, implementation languages, frameworks, IDE s, development tools and technologies used are briefly explained. Testing describes the test plan, how the system was verified. It is explained using the evidence that major aspects of the system have been tested. Testing is done with using unit, integration, system and user acceptance testing. Each function's test results are presented as test cases in tabular form with test id, test inputs, expected output, actual output, result (pass/fail) and comments for more evidence. The next section includes the conclusion. This section sums up the whole project. It discusses the realization of the original objectives and goals and how work can be taken further. The next section includes references. It comprises of a list of sources that were consulted during study and the writing of the report. Likewise, the final report is organized according to the structure mentioned above.

2. Methodology

2.1 Requirements and Analysis

Our project is a Student and Instructor Information Management System for universities in common. For this project, all the requirements and functionalities were given. They can be categorized into functional and Nonfunctional requirements as follows.

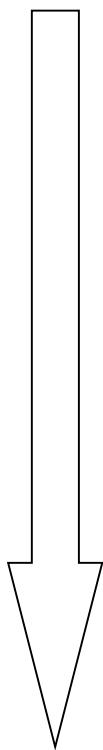
Functional Requirements

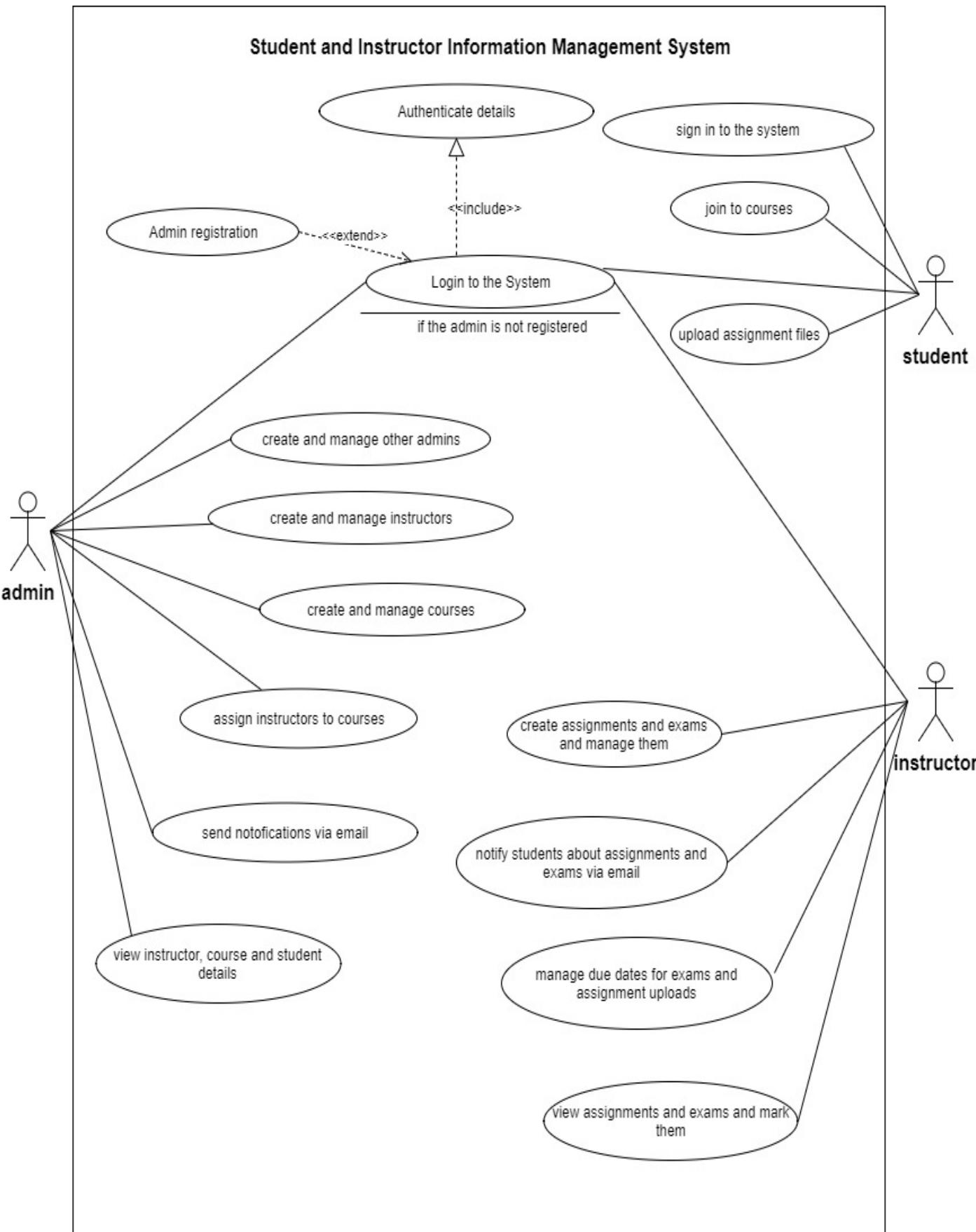
1. All the user roles admin, instructors and students should be able to login to the system successfully.
2. If the students are not registered to the system, they should be able to sign into the system successfully.
3. The system admin should be able to create other admins, instructors and courses of the system and manage them accordingly. (create, view, update and delete details) and send notifications via email.
4. The admin should be able to add instructors to the courses and notify about them via email.
5. Students should be able to join to the courses after accepted by the instructors.
6. Instructors should be able to create assignments and exams for a course with due dates and notify students about them accordingly. Management of due dates also ups to instructors.
7. Students should be able to upload files for assignments and exams before the due dates.
8. Instructors should be able to view files and enter marks for the assignments or exams and notify students about them.

Non-Functional Requirements

1. System should be secured and cannot be accessed without proper authentication.
2. Authorization should be maintained accordingly.
3. Reliability of system details with validations.
4. Cost of creating admins, instructors, courses, emails, notifications, assignments and exams of the system.
5. Network bandwidth for the well performance of the system.
6. Flexibility to allow for easy changes in the system.
7. Usability and data integrity
8. Availability of the system for regular purposes.

Use Case Diagram for the whole system





2.2 Design

2.2.1 Diagrams of the System

At present, computer plays a very important role in any formal organization, because computer works faster and accurate than human. The purpose of developing a Student and Instructor Information Management System for universities in common is to make it easy for management to store many data/reports into the computer. This type of application will contribute and provide immense help in various ways. Admin, Instructors and Students are the main user levels to access this system.

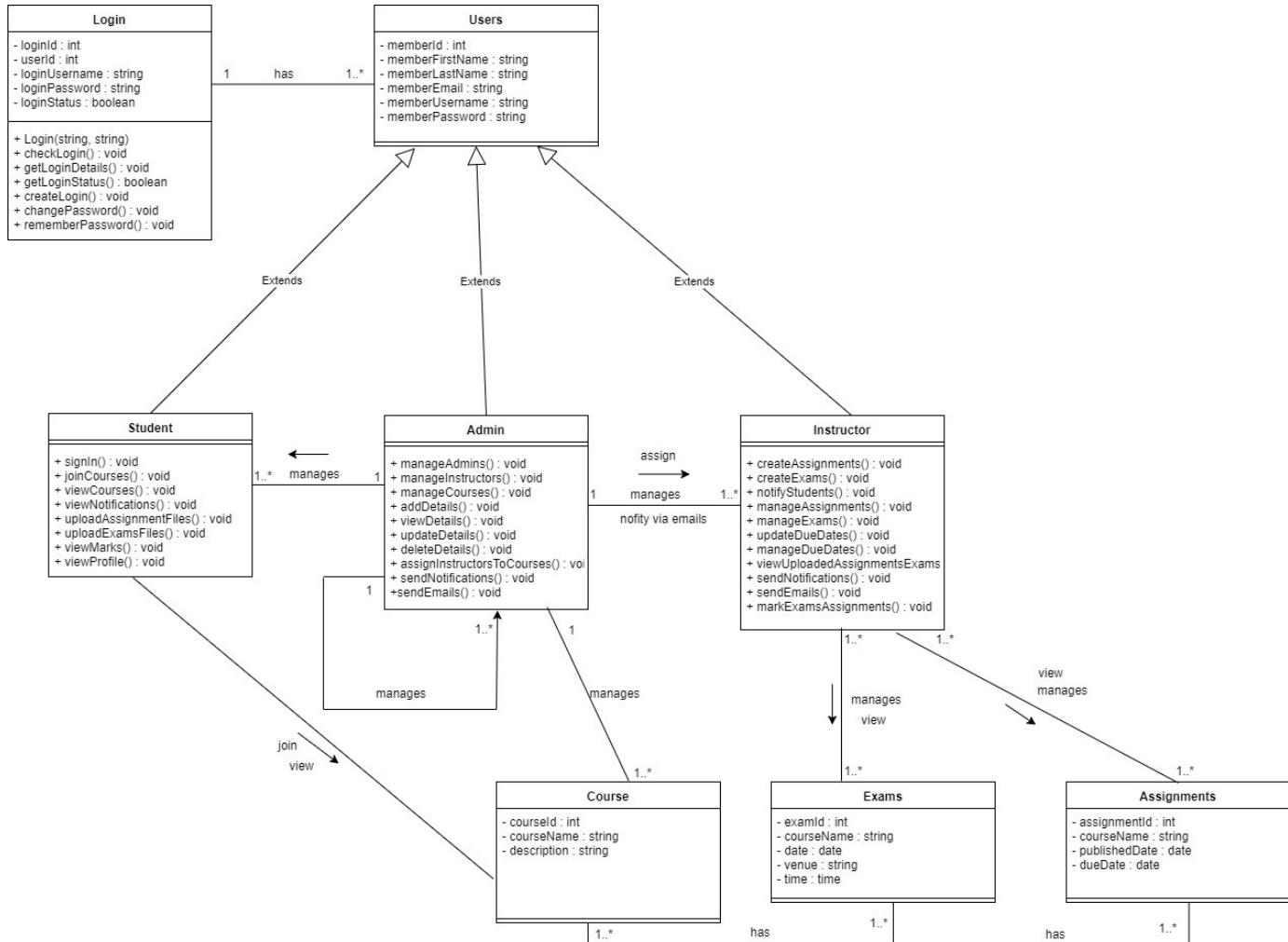
We hope to facilitate the users of the system with the operations Data Entry, Updating, Deletion and Data Retrieval. Entering reliable data to the proposed system is one of the most important factors. It will facilitate the user with user-friendly screen, which will help the users to enter the correct data to proposed system easily. Different checks have been applied in the system for the validity of data so that wrong information cannot be entered into the system easily.

Possible mistakes in the entry process are needed to be corrected at the right time so that the data remains correct. Any mistake during the entry process can be corrected through the option Update.

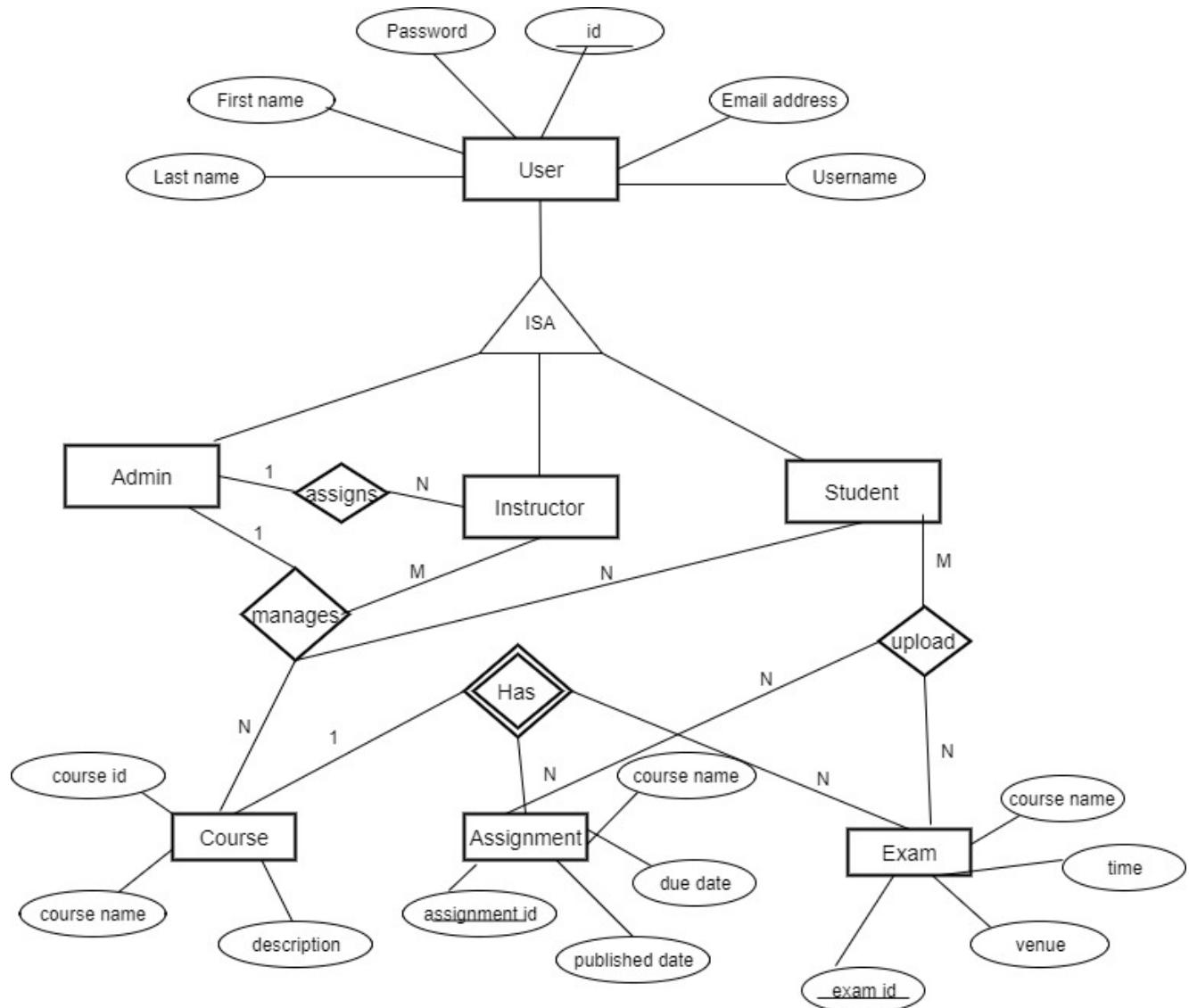
With the operation Deletion, we can easily delete a record by requesting through entering the identity number or name of an item. The specified record is deleted from the database, which is not required anymore.

The main purpose of data retrieval is to describe and explain ways and methods by means of which we get the required information from the system. The most important operation in a system is the utilization or retrieval of the stored data. Different queries are developed in programs which have been developed for the purpose of data retrieval. These queries provide different facilities to the users. The system will provide all the information about the speechified criteria similarly; a user will be given choice to print the resulted output.

2.2.1.1 Class Diagram for the System



2.2.1.2 ER Diagram for the System



2.2.2 Software Product User Manual with Interfaces

Home Page

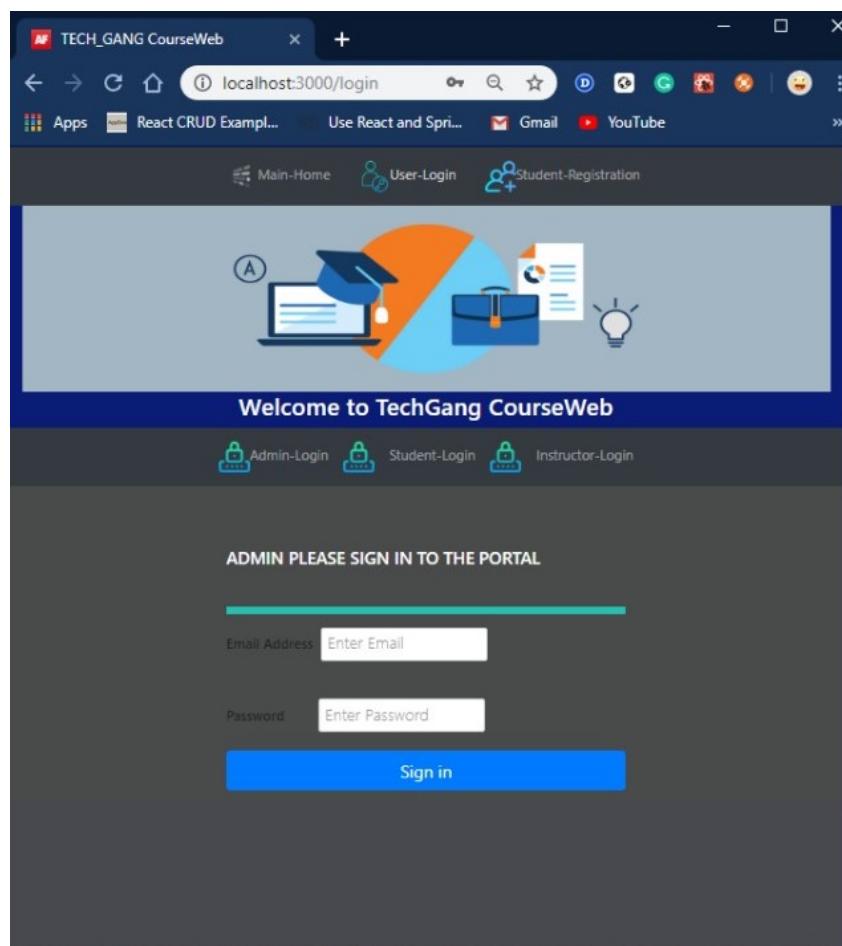
The screenshot shows a web browser window titled "TECH_GANG CourseWeb" at "localhost:3000". The page features a dark header with navigation icons and links for "Main-Home", "User-Login", and "Student-Registration". Below the header is a decorative graphic with icons for a laptop, graduation cap, briefcase, and lightbulb. A large blue banner at the top says "Welcome to TechGang CourseWeb". Below the banner is a photograph of three diverse students smiling. A yellow banner below the photo reads "2019 Enrollement is open now-Software Engineering-Electronic Engineering-Business Management". The main content area is divided into several sections: "Courses & Programs" (with a quote from William Barclay), "Our Vision & Mission" (with a quote from Friedrich Nietzsche), "Rules & Regulations" (with a quote from Clark), and "Important Links" (listing Ministry of Education, Ministry of Transport, Tourist Board, and SL Airlines). There are also sections for "ALL COURSES", "Faculty of Computing", "Faculty of Engineering", "Faculty of Humanities & Sciences", and "Faculty of Graduate Studies". Each section contains a list of courses or programs offered by that faculty.

“TechGang” is a courseweb available for admins, instructors and students of universities who wish to manage information about university items such as courses, assignments, exams, notifications and about member details accurately and efficiently. This contains the links for Main Home, User Login and Student Registration. Also, this contains important details about the courseweb such as faculties, courses and programs, vision and mission, rules and regulations and many other details about the courseweb.

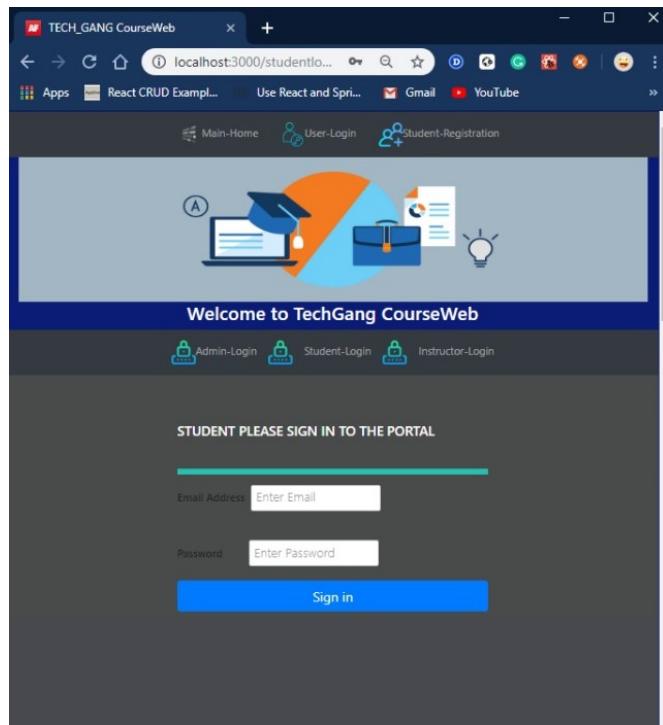
User Login

There are three user roles in our Web based application that serves as a Student and Instructor information system. They are admin, instructor and students. In the User-Login section, there are three login portals for each user role respectively.

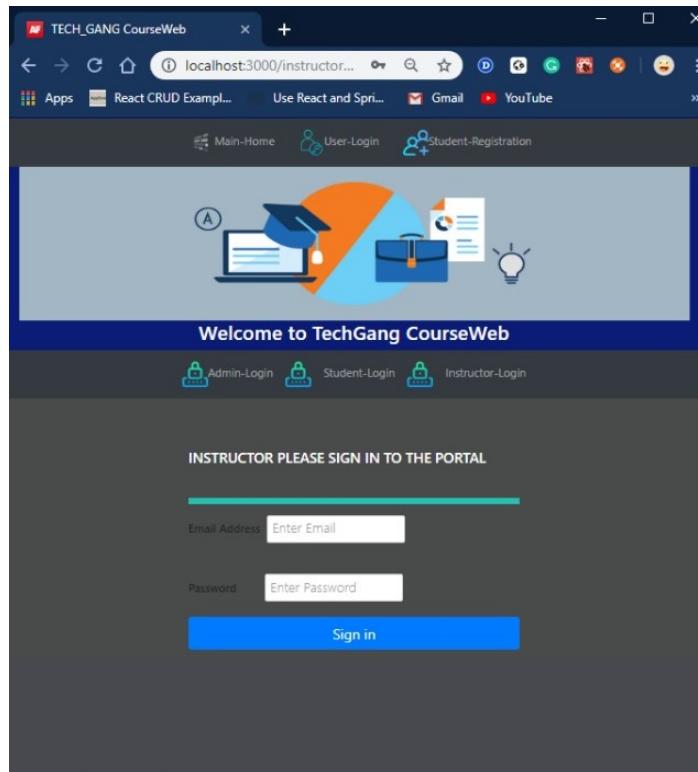
Admin Login



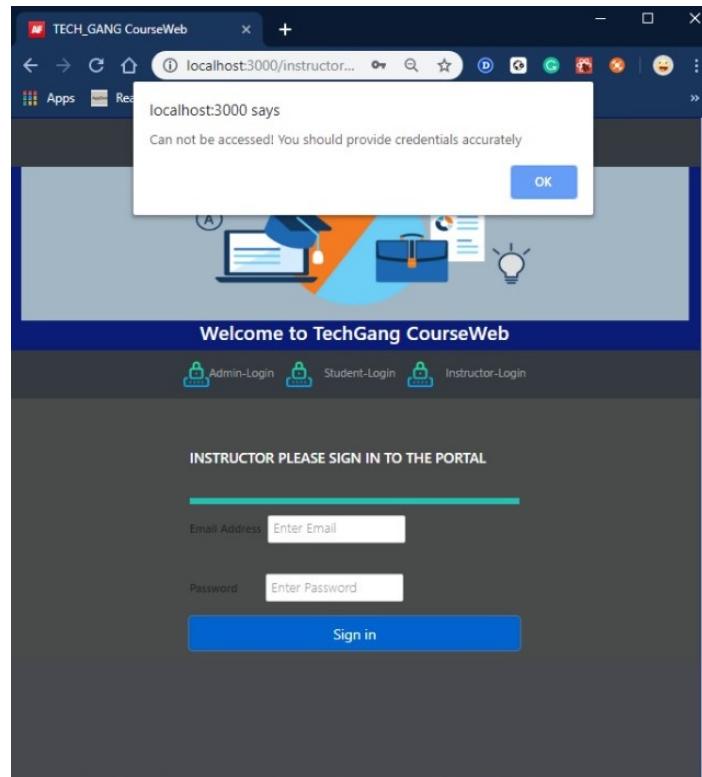
Student Login



Instructor Login

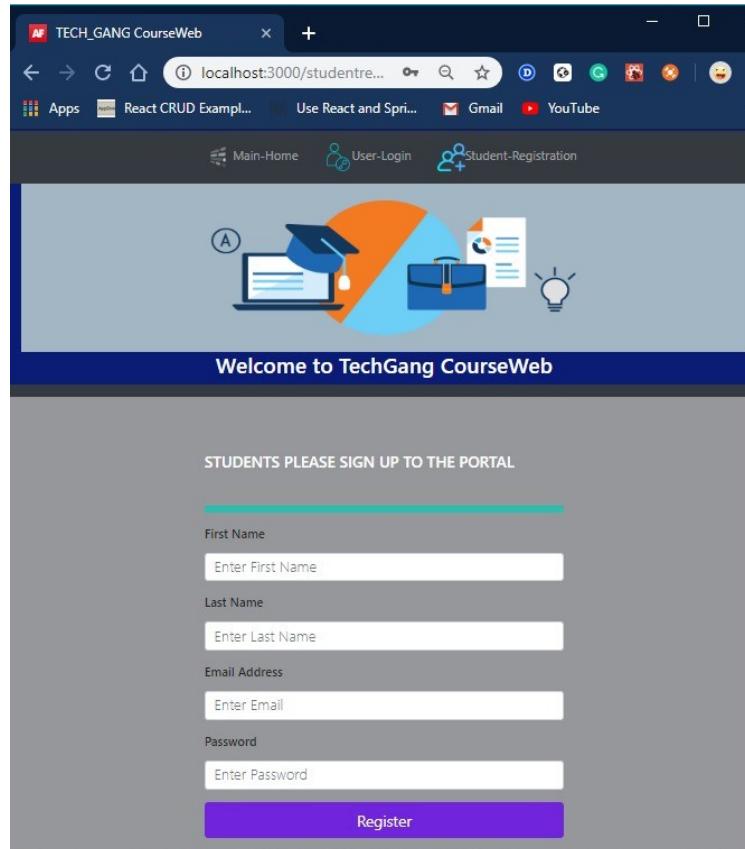


If the credentials are not valid, an error message will be displayed accordingly.

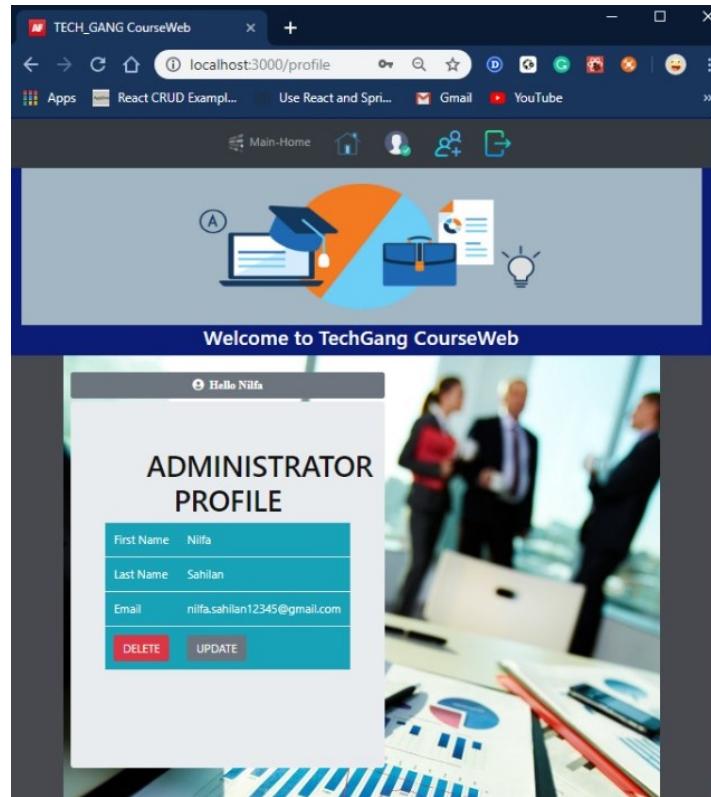


Student Registration

When a student clicks on the Student Registration link in the main home page, it is directed to the registration form of a student, in order to fill relevant details and register to the system.



After Admin Login to the System successfully



The system admin can view the Administrator profile which contains his/her first name, last name and the email address.

In order to go to the Admin Home Page, the admin should click on the home icon in the navigation bar of the Admin profile page, which displays the actions that the admin is responsible for.



When the admin clicks on the user icon with “plus” mark in the navigation bar, he/she can go to the registration pages of other admins, instructors and students. Only the system admin is responsible with the registration of other admins, students and instructors.

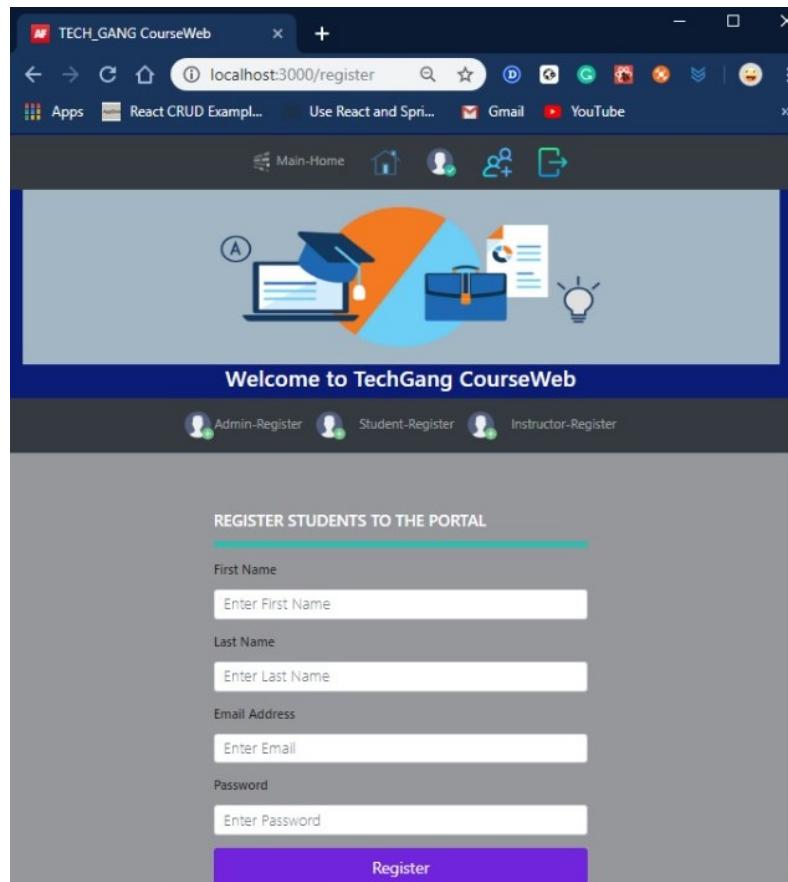
Other Admin Registration

The screenshot shows a web browser window titled "TECH_GANG CourseWeb" with the URL "localhost:3000/adminreg...". The page features a header with three registration links: "Admin-Register", "Student-Register", and "Instructor-Register". Below the header is a decorative graphic with icons of a laptop, a graduation cap, a briefcase, and a lightbulb. The main content area is titled "REGISTER ADMINISTRATORS TO THE PORTAL". It contains four input fields: "First Name" (placeholder "Enter First Name"), "Last Name" (placeholder "Enter Last Name"), "Email Address" (placeholder "Enter Email"), and "Password" (placeholder "Enter Password"). A purple "Register" button is at the bottom.

Instructor Registration

The screenshot shows a web browser window titled "TECH_GANG CourseWeb" with the URL "localhost:3000/instructor...". The page features a header with three registration links: "Admin-Register", "Student-Register", and "Instructor-Register". Below the header is a decorative graphic with icons of a laptop, a graduation cap, a briefcase, and a lightbulb. The main content area is titled "REGISTER INSTRUCTORS TO THE PORTAL". It contains four input fields: "First Name" (placeholder "Enter First Name"), "Last Name" (placeholder "Enter Last Name"), "Email Address" (placeholder "Enter Email"), and "Password" (placeholder "Enter Password"). A purple "Register" button is at the bottom.

Student Registration



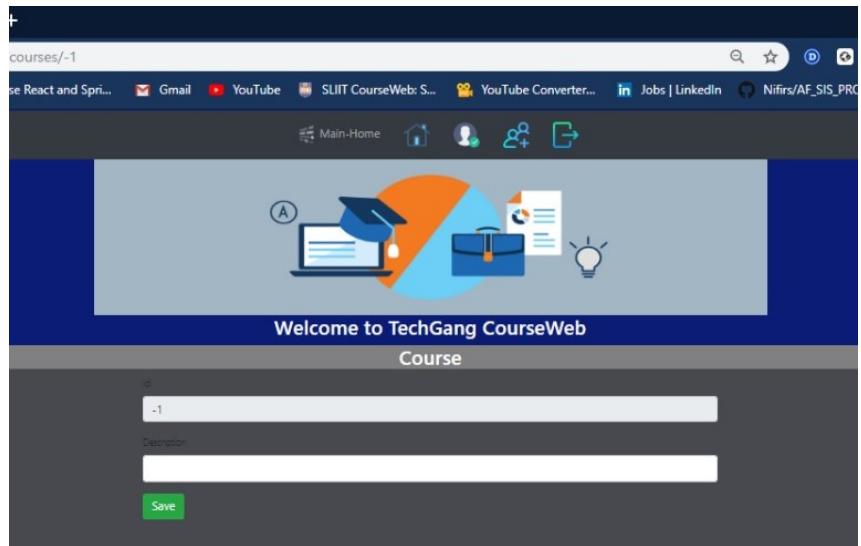
Other functionalities of Admin

According to the Admin Home Page, he/she is responsible with:

- Add Course
- View Courses
- View Instructors – Courses
- View Registered Students
- View Registered Instructors
- View Registered Administrators

Add a new Course

Only the system admin is responsible to create courses in the courseweb itself. A course is created with using its id and description.



Then, the admins can assign instructors to the created courses

A screenshot of a web browser displaying the 'TechGang CourseWeb' application. The title bar shows the URL 'localhost:3000/addCourse'. The page has a header with 'Welcome to TechGang CourseWeb' and navigation buttons for 'Back to Administrator Home' and 'Send a Mail to Instructor'. The main content area is titled 'Newly-Available course Insertion'. It contains four input fields: 'Course Name' (with placeholder 'Course Name'), 'Instructor Name' (with placeholder 'Instructor Name'), 'Instructor E-mail' (with placeholder 'Instructor E-mail'), and a large text area for 'Enter the Message' (with placeholder 'Enter the message...'). A blue 'INSERT' button is at the bottom, and a note below it says 'After insertion this will notify the Instructor via Mail'.

In this form, the admin should fill in the fields Course name, Instructor name to whom the course is assigned for, the email address of the instructor as well as the message to notify the instructor about the assignment of him/her to the course.

View Instructors – Courses

The screenshot shows a web browser window titled "TECH_GANG CourseWeb". The URL is "localhost:3000/viewCourse". The page displays a dashboard with a blue header featuring a graduation cap icon and the text "Welcome to TechGang CourseWeb". Below the header, there are two buttons: "Hello Nilfa" and "Back to Admin-Home". The main content area is titled "Instructors Assigned Courses Details" and contains a table with the following data:

Course Name	Instructor Name	Instructor E-mail	Sent Message	Edit	Delete
Pure Mathematics-2019	Nilfa Sahilan	nilfa.sahilan12345@gmail.com	Ms. Nilfa, you are assigned to this Pure Mathematics-2019 course. Have a nice day!	Edit	Delete
Applied Mathematics-2019	Nilfa Sahilan	nilfa.sahilan12345@gmail.com	You are assigned to Applied Mathematics-2019 course	Edit	Delete
Applied Mathematics-2019	Nilfa Sahilan	nilfa.sahilan12345@gmail.com	*****Applied Mathematics-2019	Edit	Delete
Applied Mathematics-2019	Nilfa Sahilan	nilfa.sahilan12345@gmail.com	Applied Mathematics-2019	Edit	Delete
Applied Mathematics-2019	Nilfa Sahilan	nilfa.sahilan12345@gmail.com	*****Applied Mathematics-2019	Edit	Delete

Update Instructor - Courses details

The screenshot shows a "Welcome to TechGang CourseWeb" page with a "Back to Course Details" button. The main content is titled "Update-Course Assigned Details". It includes a contact information section with a list of items:

- TechGang Web Solutions SIS
- 44, IdealSolutions, Colombo 03
- (555) 555-5555
- IdealSolutions@teschgang.com

Below this is a section titled "Send-Mail to the Instructors on assigned courses". It has fields for "Enter Course Name" (Pure Mathematics-2019), "Enter Instructor Name" (Nilfa Sahilan), "Enter Instructor E-mail" (nilfa.sahilan12345@gmail.com), and "Enter the Message" (Ms. Nilfa, you are assigned to this Pure Mathematics-2019 course. Have a nice day!). At the bottom are two buttons: "Update Sent Mail" and a link "Click here to send a Mail to the Instructor".

View Registered Students

The screenshot shows a web browser window titled "TECH_GANG CourseWeb" at "localhost:3000/viewStudent". The page features a header with the text "Welcome to TechGang CourseWeb" and navigation links "Hello Nilfa" and "Back to Admin-Home". Below this is a section titled "Registered Students Details" containing a table of student data:

First Name	Last Name	Student E-mail	Password	Edit	Delete
Anjali	Perera	anjali@gmail.com	\$2b\$10\$CIS4KQ6DD2FQ8jO.C3GFOLiLMQX8XKsR7rdpMvnFKR3SnMLtOOcm	<button>Edit</button>	<button>Delete</button>
Oliver	Glenn	oliver@gmail.com	\$2b\$10\$qKl7fhYLzPfBhjqwViHN.fFSvGiVjDOHHHTutcoEfFv3iNC3/Sy	<button>Edit</button>	<button>Delete</button>
Bifani	Cian	bifani@gmail.com	\$2b\$10\$AAfmI18e73qj3sfUoJjhAtOyWbWlcLmWCSqbQhw/ZpZtqyi	<button>Edit</button>	<button>Delete</button>
Kate	Vanza	kate@gmail.com	\$2b\$10\$IXVPLbqxrKDwx52kN9vmHeak8hh/k0hBj5Zj64DZeHhGJcJCRiR6	<button>Edit</button>	<button>Delete</button>
Ghani	Daniel	ghani@gmail.com	\$2b\$10\$b3tF1xQo5TfEMNGUZtaKjOV9NtieBozkuieGqRkw2NUkwmmU.VcSG	<button>Edit</button>	<button>Delete</button>
Amal	Gamage	amal@gmail.com	\$2b\$10\$vc9cSgjXUdYgenQBUnvoUeAVwltGSW/BnA2!Dr0XyscfJjWUMC	<button>Edit</button>	<button>Delete</button>
eeeeee	eeeeeee	eeeeee	\$2b\$10\$efp.VAd0aEwd/tKYhgIAOB0YnwWo.ei823gkPwjY9pww7615T2	<button>Edit</button>	<button>Delete</button>

Update Registered Students

The screenshot shows a web page titled "Welcome to TechGang CourseWeb" with a "Back to Students Details" button. The main area is titled "Update-Students Details" and contains the following form fields:

- Enter First Name: Anjali
- Enter Last Name: Perera
- Enter Student E-mail: anjali@gmail.com
- Enter the Password: \$2b\$10\$CIS4KQ6DD2FQ8jO.C3GFOLiLMQX8XKsR7rdpM

At the bottom is a large blue "Update Student" button.

View newly added courses

The screenshot shows a web browser window with the title "SLIIT CourseWeb: S...". The main content area features a decorative header with icons of a laptop, a graduation cap, a briefcase, and a lightbulb. Below this is a blue bar with the text "Welcome to TechGang CourseWeb". Underneath is a navigation bar with "Back to Administrator Home" and "Add New Course Title" buttons. The main content area is titled "All Courses" and contains a table with the following data:

ID	Description	Update	Delete
1	Learn Full stack with Spring Boot and Angular	Update	Delete
2	Learn Full stack with Spring Boot and React	Update	Delete
3	Master Microservices with Spring Boot and Spring Cloud	Update	Delete
4	Deploy Spring Boot Microservices to Cloud with Docker and Kubernetes	Update	Delete
5	Computer Networks	Update	Delete
6	Application Frameworks	Update	Delete
7	Distributed Systems	Update	Delete
8	Database Management & System Modeling	Update	Delete

View Registered Instructors

The screenshot shows a web browser window with the title "TECH_GANG CourseWeb". The main content area features a decorative header with icons of a laptop, a graduation cap, a briefcase, and a lightbulb. Below this is a blue bar with the text "Welcome to TechGang CourseWeb". Underneath is a navigation bar with "Hello Nilfa", "Main-Home", and "Back to Admin-Home" buttons. The main content area is titled "Registered Instructors Details" and contains a table with the following data:

First Name	Last Name	Student E-mail	Password	Edit	Delete
Loral	Lance	loral@gmail.com	\$2b\$10\$cd3UyfV4!qCJAg65yaGuwWKOzbcYj09C1Y4/pIVbts4Hsc j05	Edit	Delete
Zain	Hassh	zyan@gmail.com	\$2b\$10\$DLBwzKuOsD9zbLnoocMe2dPx0fauSPi8HVz8zX1ID/P8jc2aa	Edit	Delete
Nilfa	Sahiran	nilfa.sahiran12345@gmail.com	\$2b\$10\$LeplmLcSSGGf5MdpRRRCuxiHQj9TeShLa/cgREXGiMr/poO	Edit	Delete
Nirma	Jayapraba	nirma2015@gmail.com	\$2b\$10\$Zj9Qk6clTz/odyxMep3oleGFdtTMxzZXH5065726MDCETFW	Edit	Delete
Tharaka	TDK	tharakadik96@gmail.com	\$2b\$10\$WMNuGujaHgtlgjIX3Xiku8BvgcSEXYLYNwMaXhp0B290fmUThlu	Edit	Delete
Ravindu	Samaraweera	rs.ravindu11@gmail.com	\$2b\$10\$4gP0wfHLeZE/ZccQGPxuQ0gjQAUfAyA3fPccQbAcKigMVdwCe	Edit	Delete

View Registered Admins

The screenshot shows a web browser window titled "TECH_GANG CourseWeb" at "localhost:3000/viewAdministrator". The page has a dark blue header with navigation links like "Main-Home", "User-Login", "Student-Registration", and "Logout". Below the header is a decorative graphic featuring a graduation cap, a briefcase, and a lightbulb. The main content area is titled "Registered Administrators Details" and contains a table with the following data:

First Name	Last Name	Administrator E-mail	Password	Edit	Delete
Niifa	Sahilan	niifa@gmail.com	\$2b\$10\$BxzlDPGwNzVCQ0XPWXk3R04a824o17ORPy5QGOo48.dz/37dxq9K		
Namali	Perera	namali@gmail.com	\$2b\$10\$OQiGCPkG2yjBp4fbC2JuB3wTS4Y9hTzQHoDCRp78yDXuHmbduG		
Nirmani	Pathiranage	nirma@gmail.com	\$2b\$10\$7vbyVxSNbTFly6oqSEFl.u/OIRJEVcZ0QhWhOWcsOpkgfBygqtmgPG		
Tharaka	Dayanjantha	tharaka@gmail.com	\$2b\$10\$vMQNmFR92B7mmBbWX7m0yeZFm2eP6XROjK4WE219eQy9JtY43IC		
Roshini	CG	roshini@gmail.com	\$2b\$10\$V8md/tufprioMVMVeYHe.9aqssl/Ye3e0nSBgQmQaB8l2nzlmXK		
Niifa	Sahilan	niifa.sahilan12345@gmail.com	\$2b\$10\$Ti0jheRkwHtO1VdcaF18Ots11rQJUxyXCBk057ywRJuajrDoDVO		

After Student Login to the System successfully

The screenshot shows a web browser window titled "TECH_GANG CourseWeb" at "localhost:3000/viewAdministrator". The page has a dark blue header with navigation links like "Main-Home", "User-Login", "Student-Registration", and "Logout". Below the header is a decorative graphic featuring a globe and the word "EDUCATION". A modal window titled "STUDENT PROFILE" is displayed in the foreground, containing the following information:

First Name	Oliver
Last Name	Glenn
Email	oliver@gmail.com

At the bottom of the modal are two buttons: "DELETE" and "UPDATE".

The students can view the Student profile which contains his/her first name, last name and the email address.

In order to go to the Student Home Page, the student should click on the home icon in the navigation bar of the Student profile page, which displays the actions that the student is responsible for.

The screenshot shows the 'Welcome to TechGang CourseWeb' page. At the top, there is a banner with a group of diverse students outdoors. Below the banner, the text 'Student Portal' is visible. On the left side, there are two main buttons: 'View Courses' and 'View Student Marks'. To the right, there is a section titled 'Important Notices' containing three items:

- Date: 2019/07/25
Title: AF Viva
Note: AF Viva will be held
- Date: 2019/12/12
Title: DS Presentation
Note: DS presentation will be held
- Date: 2019/03/04
Title: CN Viva
Note: CN Viva will be held

In the Student Home Page, Important notices/notifications regarding Assignments and Exams are displayed for students.

Also, students are responsible to:

- View Courses
- View Student marks

[View Courses](#)

All Courses			
ID	Description	Update	Delete
1	Learn Full stack with Spring Boot and Angular	Update	Delete
2	Learn Full stack with Spring Boot and React	Update	Delete
3	Master Microservices with Spring Boot and Spring Cloud	Update	Delete
4	Deploy Spring Boot Microservices to Cloud with Docker and Kubernetes	Update	Delete
5	Computer Networks	Update	Delete
6	Application Frameworks	Update	Delete
7	Distributed Systems	Update	Delete

View Student marks

Marks List			
Subject	Register No	Marks	
Application Frameworks	IT123	79	
Software Architecture	IT123	96	
SEPMQ	SE345	87	
DS	SE908	83	

After Instructor Login to the System successfully



The instructors can view the Instructor profile which contains his/her first name, last name and the email address.

In order to go to the Instructor Home Page, the instructor should click on the home icon in the navigation bar of the Instructor profile page, which displays the actions that the instructor is responsible for.



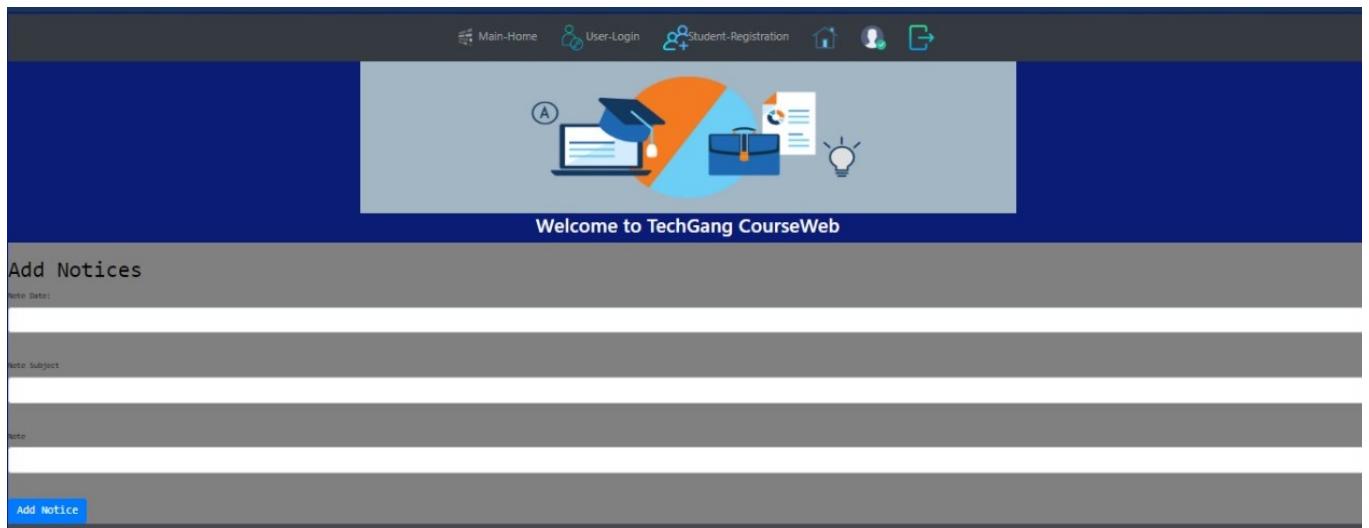
Instructors are responsible for:

- View Notices
- Add Notices
- View Students
- Add Marks
- View Marks
- View Student Marks

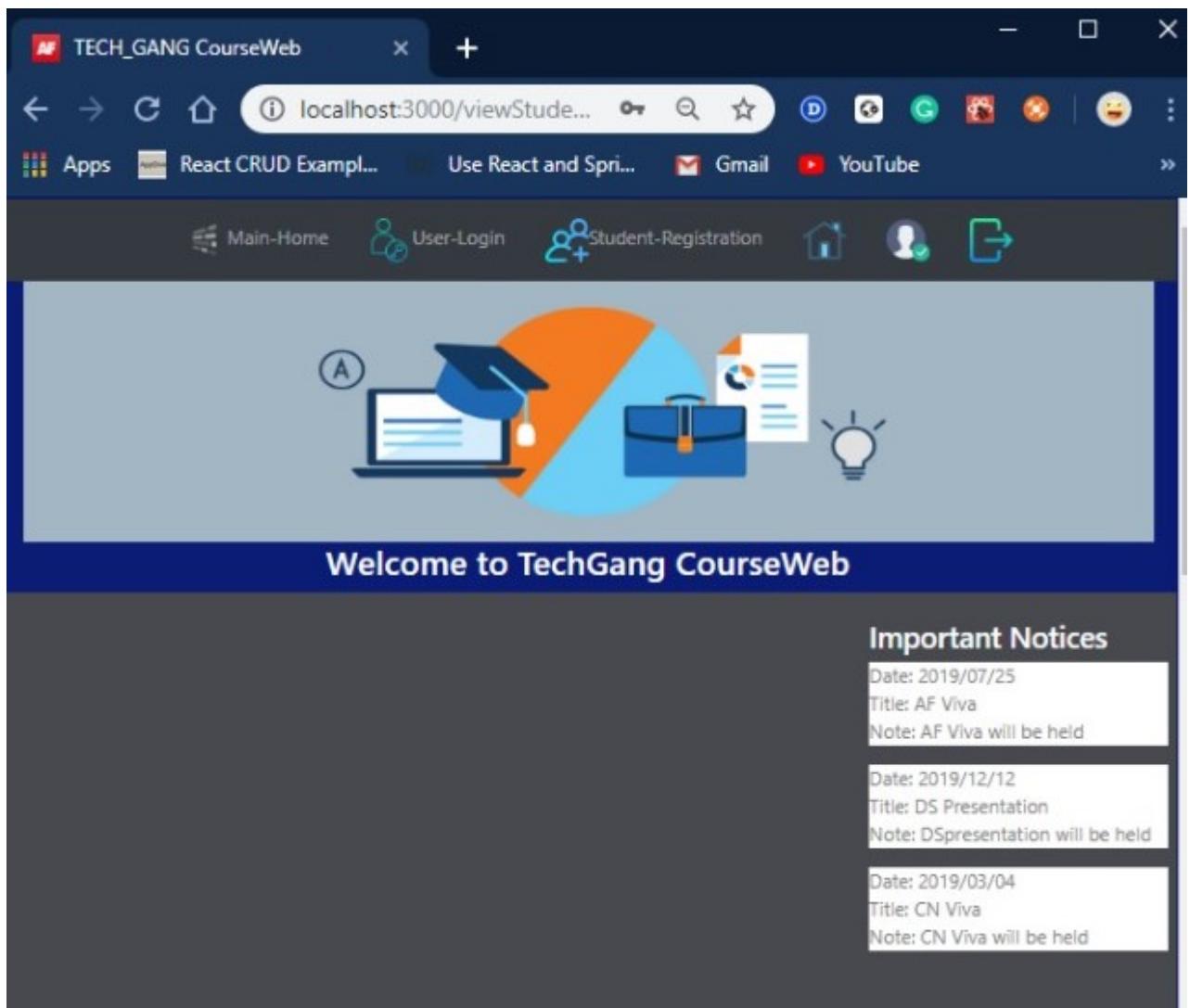
View Notices

View Notices					
Note Date	Note Subject	Note	Edit	Delete	
2019/07/25	AF Viva	AF Viva will be held	Edit	Delete	
2019/12/12	DS Presentation	DSpresentation will be held	Edit	Delete	
2019/03/04	CN Viva	CN Viva will be held	Edit	Delete	

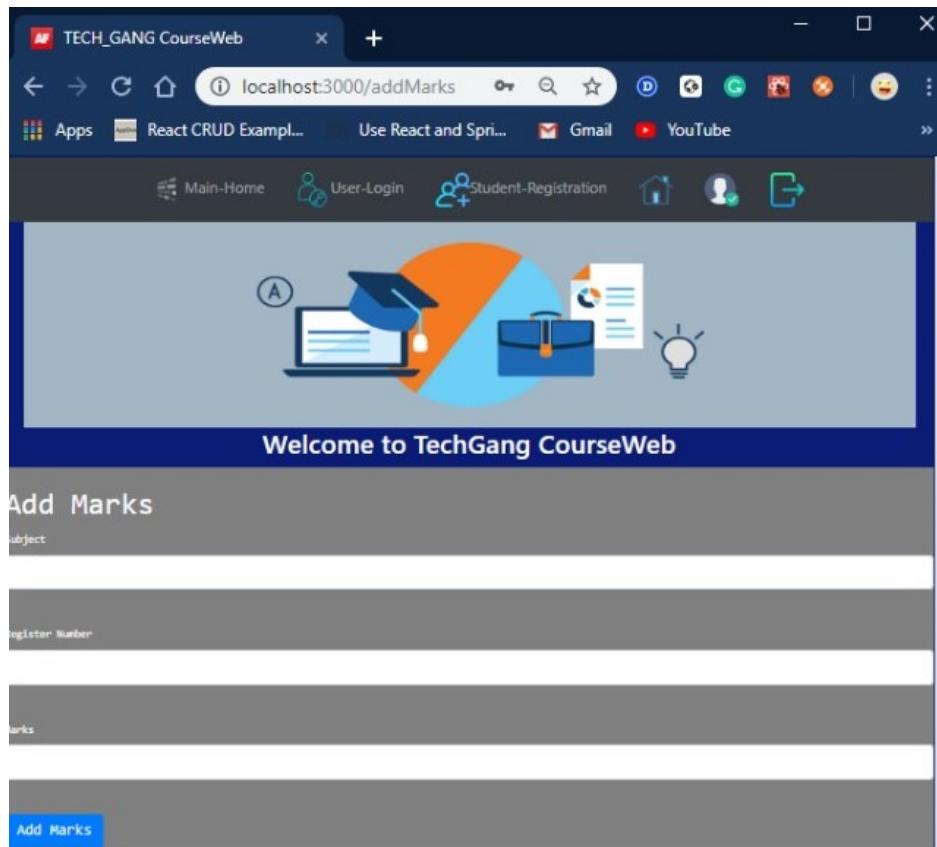
Add Notices



Student view of Notices



Add Marks



View Marks

The screenshot shows a web browser window titled 'TECH_GANG CourseWeb' with the URL 'localhost:3000/viewMarks'. The page layout is identical to the 'Add Marks' page, featuring the same header, decorative graphic, and blue banner. The main content area is titled 'View Marks' and displays a table of student marks:

Subject	Register No	Marks	Edit	Delete
Application Frameworks	IT123	79	Edit	Delete
Software Architecture	IT123	96	Edit	Delete
SEPMQ	SE345	87	Edit	Delete
DS	SE908	83	Edit	Delete

Student View of Marks

The screenshot shows a web browser window titled "TECH_GANG CourseWeb". The address bar indicates the URL is "localhost:3000/viewStude...". The browser toolbar includes standard icons for back, forward, search, and refresh. Below the toolbar, the address bar shows "localhost:3000/viewStude..." and a list of recent sites: "React CRUD Exampl...", "Use React and Spri...", "Gmail", and "YouTube". The main content area features a decorative header with icons related to education and technology, including a laptop with a graduation cap, a briefcase, and a lightbulb. The text "Welcome to TechGang CourseWeb" is prominently displayed. Below this, a section titled "Marks List" contains a table with the following data:

Subject	Register No	Marks
Application Frameworks	IT123	79
Software Architecture	IT123	96
SEPQM	SE345	87
DS	SE908	83

Likewise, all the three user roles of this Student and Instructor information management system including admin, instructors and students have their own responsibilities to be done on behalf of this automated online system.

2.3 Implementation

For this project of building a web-based application, we used JavaScript framework “React” for the front end and Node JS and Express JS for the backend. Also, we used Spring Boot Framework to implement a backend service too. The backend is JSON based Web Services. The front-end application that we developed communicates with the backend using those web services. Also, we used Mongo dB as the NoSQL Database for this project.

- Frontend: React, HTML, JavaScript, Bootstrap 4
- Backend: Node JS, Express JS, Spring Boot
- Database: Mongo DB
- IDE: Visual Studio Code, WebStorm
- Others: Nodemailer
- For testing purposes: POSTMAN, Rest Client – curl

2.3.1 React

- ✓ React is a declarative, efficient, and flexible JavaScript library for building user interfaces. It lets developers to compose complex UIs from small and isolated pieces of code called “components”.

2.3.2 HTML

- ✓ Hypertext Markup Language (HTML) is the standard markup language for documents designed to be displayed in a web browser. It can be assisted by technologies such as Cascading Style Sheets (CSS) and scripting languages such as JavaScript.

2.3.3 JavaScript

- ✓ JavaScript (JS) is a lightweight interpreted or just-in-time compiled programming language with first-class functions. While it is most well-known as the scripting language for Web pages, many non-browser environments also use it, such as Node.js.

2.3.4 Bootstrap 4

- ✓ Bootstrap is a free front-end framework for faster and easier web development.
- ✓ Bootstrap includes HTML and CSS based design templates for typography, forms, buttons, tables, navigation, modals, image carousels and many other, as well as optional JavaScript plugins.
- ✓ Bootstrap also gives you the ability to easily create responsive designs.

2.3.5 Node JS

- ✓ Node.js is an open source, cross-platform runtime environment for developing server-side and networking applications. Node.js applications are written in JavaScript and can be run within the Node.js runtime on OS X, Microsoft Windows, and Linux.
- ✓ Node.js also provides a rich library of various JavaScript modules which simplifies the development of web applications using Node.js to a great extent.

2.3.6 Express JS

- ✓ Express is a minimal and flexible Node.js web application framework that provides a robust set of features for web and mobile applications.
- ✓ It can be used to design single-page, multi-page and hybrid web applications.
- ✓ It allows to setup middleware to respond to HTTP Requests.
- ✓ It defines a routing table which is used to perform different actions based on HTTP method and URL.
- ✓ It allows to dynamically render HTML Pages based on passing arguments to templates.

2.3.7 Spring Boot

- ✓ It provides a flexible way to configure Java Beans, XML configurations, and Database Transactions.
- ✓ It provides a powerful batch processing and manages REST endpoints.
- ✓ In Spring Boot, everything is auto configured; no manual configurations are needed.
- ✓ It offers annotation-based spring application.
- ✓ Eases dependency management.
- ✓ It includes Embedded Servlet Container.

2.3.8 Mongo DB

- ✓ MongoDB is an open-source document database and leading NoSQL database.

2.3.9 Nodemailer

- ✓ Nodemailer is an easy to use module to send e-mails with Node.JS (using SMTP or send mail or Amazon SES) and is Unicode friendly.

2.4 Deployment

1.Download the Project folder.

2.Open the Terminal and go to the project folder and type:

cd client

3.Then type:

npm install

4.All the dependencies in the client folder, package. json will be downloaded.

5.Now open a new Terminal and go to the project folder and type:

1.npm install

11.nodemon server.js

6.All the dependencies in the project folder, package. json will be downloaded and the Express server, Mongo DB server will be started.

7.Now go to the previously open Terminal (in the client folder) and type:

npm start

8.Then the Student and Instructor Information System Application will be deployed in the <http://localhost:5001/>

2.5 Testing

Software testing is the evaluation of the software against requirements gathered from users and system specifications. Testing is conducted at the phase level in software development life cycle or at module level in program code. Software testing comprises of Validation and Verification.

Unit Testing

While coding, all the group members performed some tests on the specific function, to know if the program is error free. While developing and building the specific function, each group member tested the own code by making the product a working thing. For example, everybody in the group had many forms in their own function. So, by filling them and allowing them to be submitted to the system itself, it could be tested in a unit tested way, whether the details are filled correctly, whether the validations work accurately and whether the details were submitted to the system successfully. Unit testing helped each member to decide that individual units of the program are working as per requirement and are error free.

Integration Testing

Even if the units of the software are working fine individually, there is a need to find out whether the units if integrated together would also work without errors. For example, argument passing and data updating. Each of the group member did integration testing together by integrating each of their own function. For that, we used one laptop and each function's source codes were copied and pasted in a new project. A new project was created in the laptop, and all the source codes of each function were placed accurately. For all the functions, one database was created, and all the earlier built table queries of each member were imported for the respective database. After creating all the tables, data in those tables were tested individually by each member. Manual testing was used in integration procedure. The group used a GitHub repository for the project to be integrated. While integrating each function, manual testing was done for each part respectively.

System Testing

The software is compiled as a product and then it is tested. We accomplished this using functionality testing and performance testing. All the group members tested all functionalities of the software against their requirement. The performance testing proved the efficiency of the software. We tested the effectiveness and average time taken by the software to do the desired task.

2.5.1 Test Cases

1. Admin Login Functionality

Test steps:
1. Navigate to Admin login page. 2. In the ‘Email Address’ field, enter the username (Email address) of the Admin. 3. In the ‘password’ field, enter the password of the admin. 4. Click ‘Sign in’ button.

Test ID	Test Inputs	Expected Output	Actual Output	Result (Pass/Fail)
01	Username: admin123@gmail.com Password: admin123	Redirect to the home page	Redirected to the home page	Pass
02	Username: admin123@gmail.com Password:123	Display error message “These credentials do not match our records.”	Displayed error message “These credentials do not match our records.”	Pass

2. Student Registration Functionality

Test steps:
<p>1. Navigate to Student Sign up page.</p> <p>2. In the ‘First Name’ field, enter the first name of the student.</p> <p>3. In the ‘Last Name’ field, enter the last name of the student.</p> <p>4. In the ‘Email Address’ field, enter the username (Email address) of the student.</p> <p>5. In the ‘password’ field, enter the password of the student.</p> <p>6. Click ‘Register’ button.</p>

Test ID	Test Inputs	Expected Output	Actual Output	Result (Pass/Fail)
01	Enter a telephone number for the field “Email Address” instead of an email address	A validation error should be appeared telling to enter the email address in the correct format	A validation error appeared telling to enter the email address in the correct format	Pass
02	Fill in the student registration form with correct details	The form should be submitted with no validation errors	The form was submitted without validation errors	Pass
03	Select the “Update” option to update details	The previous form should be re-appearing with previous filled values	The previous form reappeared with previous filled values	Pass
04	Select the “Delete” option to delete a record	The record should be deleted from the table	The record was deleted from the table	Pass

3. Assigning instructors to a course functionality

Test steps:
<ol style="list-style-type: none"> 1. Navigate to Newly available course insertion page. 2. In the ‘Course Name’ field, enter the name of the course. 3. In the ‘Instructor Name’ field, enter the name of the instructor to whom the course is being assigned. 4. In the ‘Instructor Email’ field, enter the Email address of the instructor. 5. In the ‘message’ field, enter the message to be sent via email. 6. Click ‘Insert’ button.

Test ID	Test Inputs	Expected Output	Actual Output	Result (Pass/Fail)
01	Enter a telephone number for the field “Instructor Email” instead of an email address	A validation error should be appeared telling to enter the email address in the correct format	A validation error appeared telling to enter the email address in the correct format	Pass
02	Fill in the instructor assign form with correct details	The form should be submitted with no validation errors and an email should be received by the instructor	The form was submitted without validation errors and an email was received by the instructor	Pass



TechGang AF_SIS
techgang.afsis@gmail.com
[Privacy](#)

[Google Account](#)

Gmail Search mail

Compose

Inbox 152

Starred Snoozed Important Sent Drafts Categories [Imap]/Sent [Imap]/Trash Unwanted More

AF SIS-PROJECT [Inbox](#)

Nodemailer Course Message <techgang.afsis@gmail.com> to me Jun 21, 2019, 2:20 AM (2 days ago) [Star](#) [Reply](#) [Forward](#)

You have a new course request

Contact Details

- Course Name: Master Microservices with Spring Boot and Spring Cloud
- Instructor Name: Nirmani Pathiranage
- Instructor Email: nirma2015@gmail.com
- Message: Miss Nirmani you are assigned to Master Microservices with Spring Boot and Spring Cloud course

Message

Miss Nirmani you are assigned to Master Microservices with Spring Boot and Spring Cloud course

[Reply](#) [Forward](#)

Testing for running of Backend Services of Node JS/Express JS using REST Client (Login and Registration of Students)

Registration

Request

Method POST Request URL http://localhost:5000/students/register

Parameters ^

Headers Body Variables

Body content type application/json Editor view Raw input

FORMAT JSON MINIFY JSON

```
{ "first_name": "John", "last_name": "Smith", "email": "johnsmith@gmail.com", "password": "12345", "created": "2019/06/23" }
```

200 OK 1066.00 ms



```
{ "status": "johnsmith@gmail.com registered!" }
```

Login

Request

Method: POST Request URL: http://localhost:5000/students/login

Parameters ^

Headers	Body	Variables
Body content type: application/json	Editor view Raw input	
FORMAT JSON MINIFY JSON	{ "first_name": "John", "last_name": "Smith", "email": "johnsmith@gmail.com", "password": "12345", "created": "2019/06/23"} }	

200 OK 271.74 ms DETAILS ▾

eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJfaWQiOiI1ZDBmNDAyYzMxZDU3MzA4MjRmZTA1OWIiLCJmaXJzdF9uYW1IjoisM9obiIsImxhc3RfbmFtZSI6IlNtaXRoiIiwizW1haWwiOiJqb2huc21pdGhAZ21haWwuY29tIiwiZWFOIjoxNTYxMjgwODIwLCJleHAiOjE1NjEyODIyNjB9.gLb2um3wRb1DCdZoZrmxPYqSM2M02B576UiV3BXfMfc

3 Conclusion

Through the high-level design diagrams and documents, we hope that we have provided a clear image of the web application. The production of this software product has faced many objectives and has achieved many goals. The result of this development is to produce a web application to ease up the student and instructor information management of universities.

1. Goals

- Gather each information about the ongoing information management system at most of the universities.
- Provide a fully automated web application to handle the university management activities.
- Create interfaces for students, instructors and the system admins to interact with the management system.
- Create and maintain a digitalized database to hold the student, instructor, admin, course, assignment, exam information.
- Make the software product user friendly.

2. Objectives

- Create and maintain large database to hold the data.
- Input all the student, instructor, exams, course, assignment and admin information to the database.
- Upload and download files, exams, assignments and other needed files immediately with ease.
- Send automated notifications via emails effectively.

The above-mentioned goals and objectives were realized by the software development team during the requirement gathering and analysis phase in the development life cycle. One of our main concern is to make this software product a user-friendly environment for everyone even with the least information technology experience.

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