

**MINI PROJECT
(2020-2021)**

**Varithms (An E-learning Based Platform Specifically for
Algorithms)**

MID-TERM REPORT



**Institute of Engineering & Technology
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Last but not least we would like to thank our family members and friends for their constant support and encouragement.

ABSTRACT

E-Learning is the process of using technology to enhance learning and tutoring or it is a more effective way of delivering a visual and immersive learning experience on a computer or mobile device. In this new era of globalization, where digitalization is playing a pivotal role in upgrading the life of people all around the globe, whether its industrial sector, educational sector, banking sector, etc. E-learning platforms are making learning easier. E-learning is more of, out-of-classroom and in-room educational experiences imparted to the users via technology, it is more of flexible learning as it is available anytime, anywhere. Hence, we can say the E-learning platform is breaking barriers as one can learn anywhere, these platforms also lack time constraints because one can access the content available on these sites 24*7.

These e-learning platforms are rising exponentially, these platforms are even helping professionals who cannot afford the time for in-classroom teaching due to busy schedules, those professionals to get themselves equipped with the knowledge they want to seek. For developing countries like India who are progressing towards E-Governance and education, these e-learning platforms are working as a boon. In this new era of Electronics, we know the concept of e-learning, which is helping us minimize the use of pen and paper. There are many benefits of e-learning platforms like easy sharing of data and information.

Our E-Learning platform will impart knowledge related to Algorithms, how they are implemented, and what are the advantages attached to these algorithms.

We have designed this platform to make Algorithms learning more interesting, effective, and efficient. As far as we believe, smart learning is the demand of the hour. We are dedicated to providing you the best of knowledge keeping all your placement requirements in mind. Our main concern here is not only to provide you with all the algorithms to study but also to make things a lot simpler for the students. Minimizing your struggle while understanding them.

We're here to provide you with simpler techniques to understand a particular algorithm and to implement it.

1.Introduction

1.1 Background of the topic

E-Learning is the process of using technology to enhance learning and tutoring or it is a more effective way of delivering a visual and immersive learning experience on a computer or mobile device. These e-learning platforms are rising exponentially, these platforms are even helping professionals who cannot afford the time for in-classroom teaching due to busy schedules, those professionals to get themselves equipped with the knowledge they want to seek.

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. Others may include Angular, React, Node.JS.

Web browsers receive HTML documents from a web server or local storage and render the documents into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document.

HTML elements are the building blocks of HTML pages. With HTML constructs, images and other objects such as interactive forms may be embedded into the rendered page. HTML provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes, and other items. HTML elements are delineated by tags, written using angle brackets. Tags such as `` and `<input />` directly introduce content into the page. Other tags such as `<p>` surround and provide information about document text and may include other tags as sub-elements. Browsers do not display the HTML tags but use them to interpret the content of the page.

1.2 Motivation and Overview

The E-learning platforms are more empowering, effective, efficient, and economical. Initially, when these platforms started developing they were based on Computer-based

learning (CBL), the role of the e-learning system for which they were developed was to impart knowledge in a more efficient method. Later on, these platforms developed which were based on Computer-supported collaborative learning (CSCL) which refers to the activity of peers interacting with each other for learning and with the support of information and communication technologies (ICT). Nowadays, it is an increasing trend to create virtual learning environments(VLE) as they are more efficient, effective, and economical.

Drawbacks of Existing System :

- They are less efficient, as they are using the orthodox method of teaching.
- Most of the e-learning platforms are paid, not everybody can afford it.
- They are not able to provide information in an effective manner

Need for new System :

- To make the e-learning process faster
- Reduce the time for E-learning
- To move towards digitalization and reduce paper use
- To make learning more interesting.

1.3 Objective

We have designed this platform to make Algorithms learning more interesting, effective, and efficient.

As far as we believe, smart learning is the demand of the hour. We are dedicated to providing you the best of knowledge keeping all your placement requirements in mind. Our main concern here is not only to provide you with all the algorithms to study but also to make things a lot simpler for the students. Minimizing your struggle while understanding them.

We're here to provide you with simpler techniques to understand a particular algorithm and to implement it. For that, we will be your companion throughout your journey towards your ultimate goal which is to achieve placement in your dream company. Before making this platform work well for you guys we as a team have done lots of research and found out that there are very few platforms doing this for you. Keeping all these things in mind we will provide you with the best content and guidance. Due to this pandemic, a lot of platforms have come up so you need to make a wise choice for yourself, seeing all the facilities a platform provides you with.

1.4 Software Development Model:

For this project, we will be using the Agile Software Development Model. A brief introduction is given below :

Agile Software Development Model:

In software development, agile (sometimes written Agile) approaches development requirements and solutions through the collaborative effort of self-organizing and cross-functional teams and their customer(s)/end user(s). It advocates adaptive planning, evolutionary development, early delivery, and continual improvement, and it encourages flexible responses to change. It was popularized by the Manifesto for Agile Software Development. The values and principles espoused in this manifesto were derived from and underpin a broad range of software development frameworks, including Scrum and Kanban. While there is much anecdotal evidence that adopting agile practices and values improves the agility of software professionals, teams, and organizations, some empirical studies have disputed that evidence.

1.5 Requirements

Software Requirements:

- Android Studio 3.5
- Java Development Kit 11
- Flutter SDK 1.17(Stable), Dart SDK
- Google FirebaseAuth, Firestore, Firebase Hosting, and Testing
- Dart, Kotlin, Swift, XML, HTML5, JavaScript, CSS, Bootstrap, jQuery
- Google Firebase
- Adobe xD and Figma
- Google Chrome 86

Hardware Requirements:

- Intel Core i5 or AMD FX-4300
- Microsoft® Windows® 7/8/10 (64-bit) / GNOME or KDE
- desktop. Tested on Linux based on Debian.
- 4 GB of RAM
- Huawei Honor 20i (Android) and Apple iPhone 7 [For
- on-Device Testing]
- 4 GB of available disk space minimum (500 MB for IDE + 1.5
- GB for Android SDK and emulator system image)
- 1280 x 800 minimum screen resolution.

2. Technology Used

2.1 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.

Web browsers receive HTML documents from a web server or local storage and render the documents into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document. HTML elements are the building blocks of HTML pages. With HTML constructs, images and other objects such as interactive forms may be embedded into the rendered page. HTML provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes, and other items. HTML elements are delineated by tags, written using angle brackets. Tags such as `` and `<input />` directly introduce content into the page. Other tags such as `<p>` surround and provide information about document text and may include other tags as sub-elements. Browsers do not display the HTML tags but use them to interpret the content of the page.

HTML can embed programs written in a scripting language such as JavaScript, which affects the behavior and content of web pages. The inclusion of CSS defines the look and layout of content. The World Wide Web Consortium (W3C), the former maintainer of the HTML and current maintainer of the CSS standards, has encouraged the use of CSS over explicit presentational HTML since 1997.

2.2 CSS

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a document written in a markup language like HTML. CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript.

CSS is designed to enable the separation of presentation and content, including layout, colors, and fonts. This separation can improve content accessibility, provide more flexibility and control in the specification of presentation characteristics, enable multiple web pages to share formatting by specifying the relevant CSS in a separate .css file which reduces complexity

and repetition in the structural content as well as enabling the .css file to be cached to improve the page load speed between the pages that share the file and its formatting.

Separation of formatting and content also makes it feasible to present the same markup page in different styles for different rendering methods, such as on-screen, in print, by voice (via speech-based browser or screen reader), and on Braille-based tactile devices. CSS also has rules for alternate formatting if the content is accessed on a mobile device.

The name cascading comes from the specified priority scheme to determine which style rule applies if more than one rule matches a particular element. This cascading priority scheme is predictable. The CSS specifications are maintained by the World Wide Web Consortium (W3C). Internet media type (MIME type) text/CSS is registered for use with CSS by RFC 2318 (March 1998). The W3C operates a free CSS validation service for CSS documents

2.3 JavaScript

JavaScript, often abbreviated as JS, is a programming language that conforms to the ECMAScript specification. JavaScript is high-level, often just-in-time compiled, and multi-paradigm. It has curly-bracket syntax, dynamic typing, prototype-based object-orientation, and first-class functions.

Alongside HTML and CSS, JavaScript is one of the core technologies of the World Wide Web. JavaScript enables interactive web pages and is an essential part of web applications. The vast majority of websites use it for client-side page behavior, and all major web browsers have a dedicated JavaScript engine to execute it. As a multi-paradigm language, JavaScript supports event-driven, functional, and imperative programming styles. It has application programming interfaces (APIs) for working with text, dates, regular expressions, standard data structures, and the Document Object Model (DOM). However, the language itself does not include any input/output (I/O), such as networking, storage, or graphics facilities, as the host environment (usually a web browser) provides those APIs.

JavaScript engines were originally used only in web browsers, but they are now embedded in some servers, usually via Node.js. They are also embedded in a variety of applications created with frameworks such as Electron and Cordova.

Although there are similarities between JavaScript and Java, including language name, syntax, and respective standard libraries, the two languages are distinct and differ greatly in design.

2.4 Firebase

Firebase is a platform developed by Google for creating mobile and web applications. It was originally an independent company founded in 2011. In 2014, Google acquired the platform and it is now their flagship offering for app/website development. Firebase gives you a platform to build, improve, and grow your app. It is a cloud platform that provides Backend as a service (BaaS).

Firebase gives the functionality to register and authenticate your users and save their data in the JSON format. It also provides the feature to upload your data into the database and retrieve it as per your requirement.

2.5 Visual Studio Code

Visual Studio Code is a free source-code editor made by Microsoft for Windows, Linux, and macOS. Features include support for debugging, syntax highlighting, intelligent code completion, snippets, code refactoring, and embedded Git. Users can change the theme, keyboard shortcuts, preferences, and install extensions that add additional functionality.

Visual Studio Code's source code comes from Microsoft's free and open-source software VSCode project released under the permissive Expat License, but the compiled binaries are freeware for any use.

In the Stack Overflow 2019 Developer Survey, Visual Studio Code was ranked the most popular developer environment tool, with 50.7% of 87,317 respondents reporting that they use it.

2.6 GCP

Google Cloud Platform is a set of Computing, Networking, Storage, Big Data, Machine Learning and Management Services provided by Google that runs on the same Cloud

infrastructure that Google uses internally for its end-user products such as Google Search, Gmail, Google Photos, and YouTube

2.7 Flutter

Flutter is a free and open-source mobile UI framework created by Google and released in May 2017. It allows you to create native mobile applications with only one codebase. This means that you can use one programming language and one codebase to create two different apps. (For iOS and Android)

Flutter consists of two parts:

- An SDK (Software Development Kit)
- A Framework

To develop with Flutter you will use a programming language called Dart. The Language was created by Google in October 2011.

Dart focuses on front-end development, and you can use it to create Mobile and Web Applications.

2.8 Dart

Dart is a client-optimized programming language for apps on multiple platforms. It is developed by Google and is used to build mobile, desktop, server, and web applications. Dart is an object-oriented, class-based, garbage-collected language with C-style syntax. Dart can compile to either native code or JavaScript.

3. Software Requirement Analysis

3.1 Problem Statement

The E-learning platforms are more empowering, effective, efficient, and economical. Initially, when these platforms started developing they were based on Computer-based learning (CBL), the role of the e-learning system for which they were developed was to impart knowledge in a more efficient method.

Drawbacks of Existing System :

- They are less efficient, as they are using the orthodox method of teaching.
- Most of the e-learning platforms are paid, not everybody can afford it.
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Need for new System :

- To make the e-learning process faster
- Reduce the time for E-learning
- To move towards digitalization and reduce paper use
- To make learning more interesting.

3.2 Modules

The project will consist of various modules, each module having lots of functionalities :

Login Module :

- Will allow users to log in to access their profile.
- Will allow users to sign up for a new account
- Easy Access through various providers including Facebook and Google.
- Users can also use their phone numbers to receive an OTP and log in.

Learning Module:

- Users can understand various algorithms by reading out the simplified core concept.
- Interactive examples for better understanding.
- Text-to-Speech Services for the reading content included.
- Testing services to check the progress and understanding

Searching Module:

- Efficiently search across hundreds of algorithms(Implementation Of TRIE algorithm)
- Categorical Searching.

Recommendation Module:

- Recommending what to learn next based on previous categories
- Recommending next to learn based on popularityRecommending next to learn based on usability.

4. Software Design

4.1 Use Case Diagram

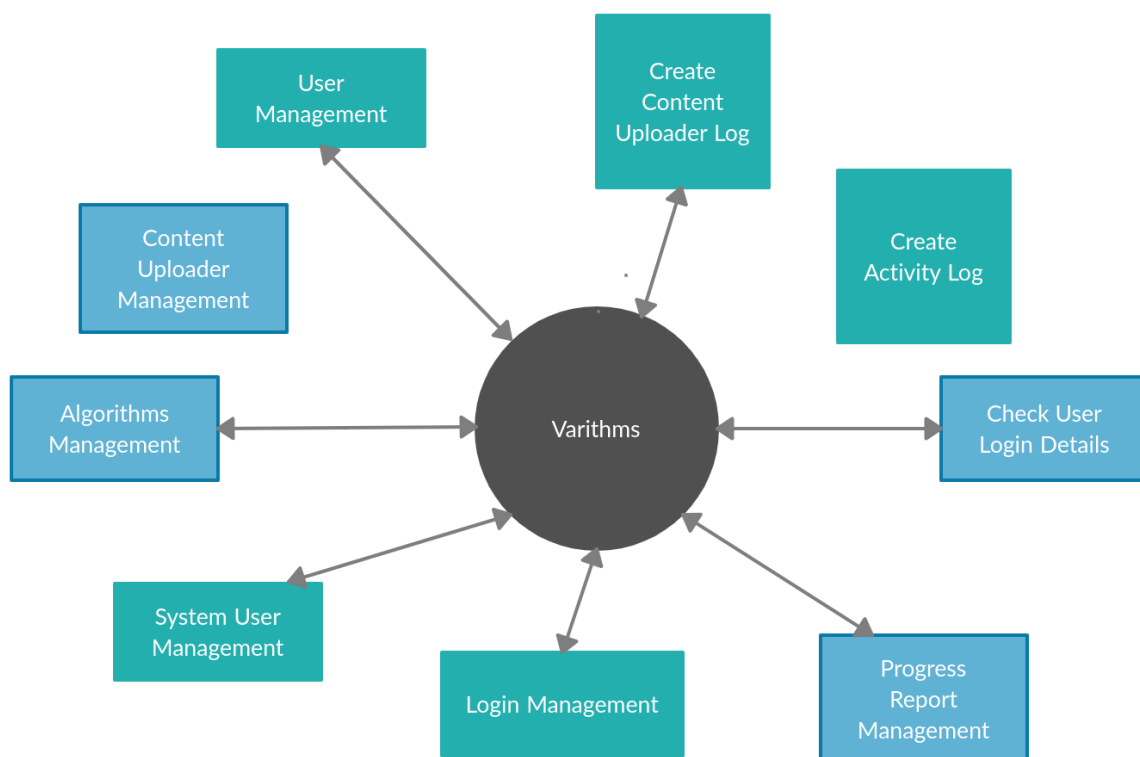
Use case diagram is the first step of software requirement analysis to final achievement, and it expresses how people use a system. The use case shows users, what kind of service users require, and services are offered by clients to the system. It helps the client to have a better understanding of functions in these elements and also benefits developers to achieve them. The use case diagram is commonly used to describe the system and subsystem.



4.2 Data Flow Diagram (DFD)

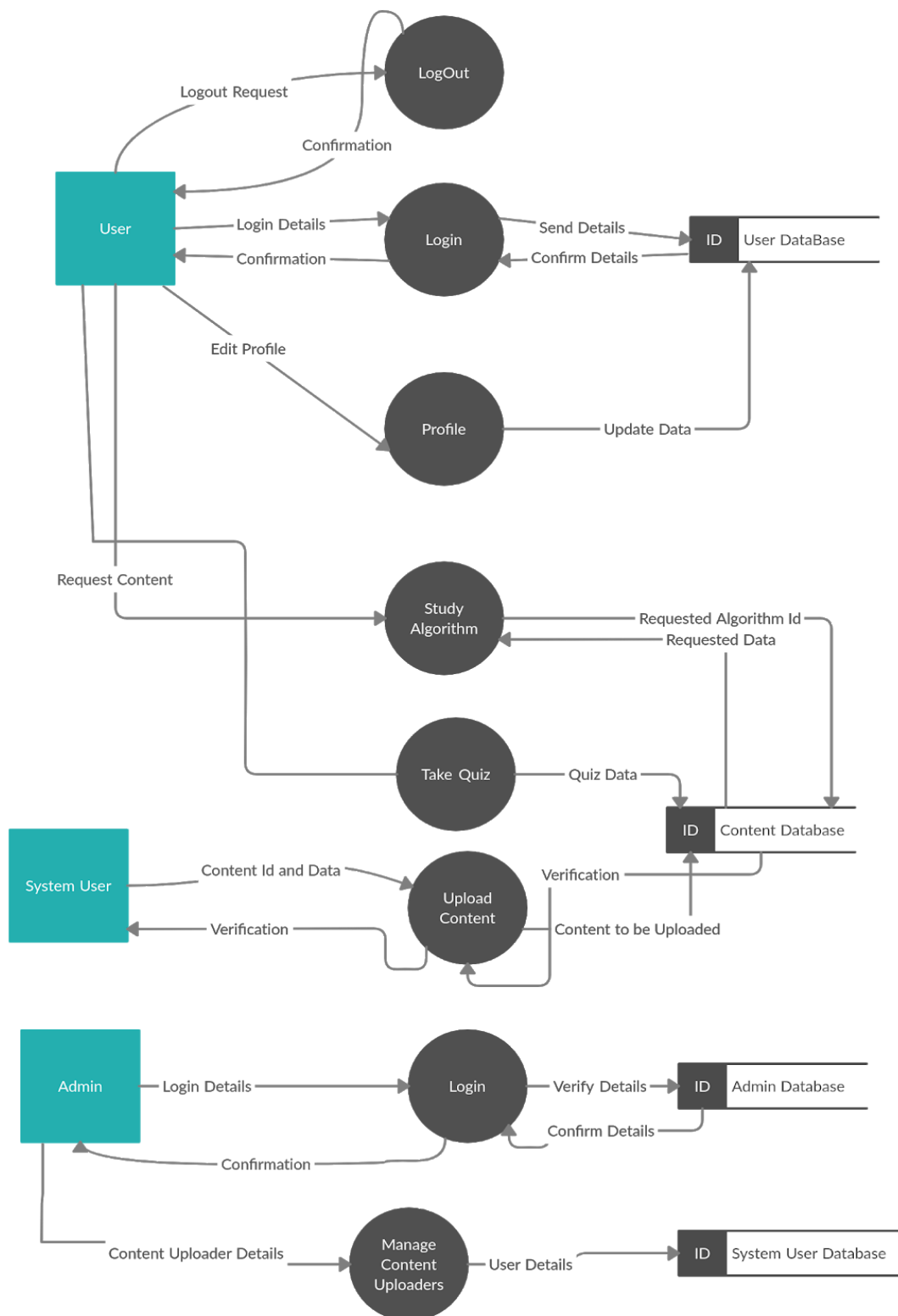
A data-flow diagram is a way of representing a flow of data through a process or a system (usually an information system). The DFD also provides information about the outputs and inputs of each entity and the process itself. A data-flow diagram has no control flow, there are no decision rules and no loops. Specific operations based on the data can be represented by a flowchart.

4.2.1 Level 0 DFD



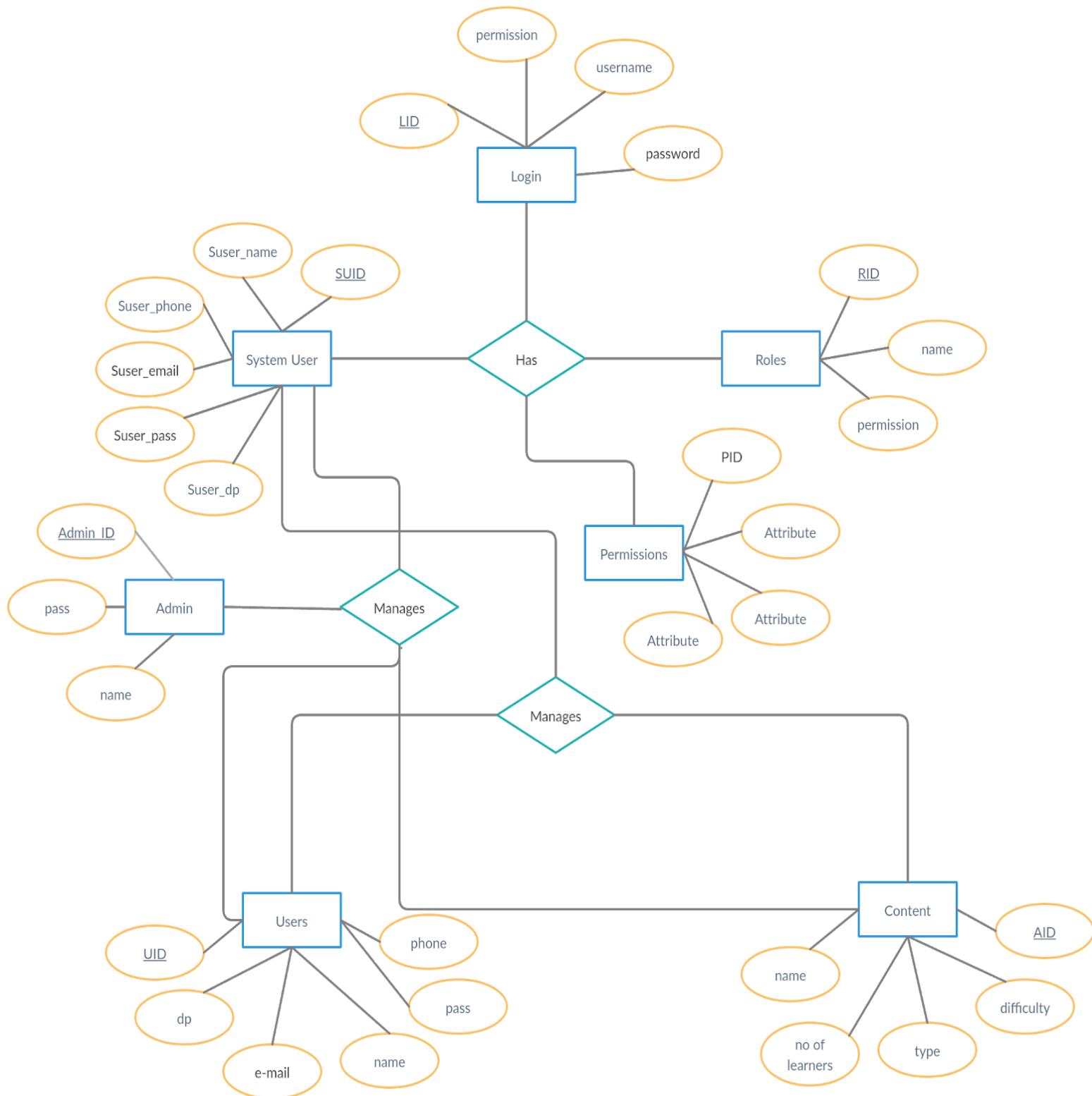
Level - 0 Data Flow Diagram

4.2.2 Level 1 DFD



Level-1 Data Flow Diagram

4.3 Entity-Relationship (ER) Diagram



5.Implementation and User Interface

In this section, I will discuss some important parts of implementation in this site. They are critical functions that make the system run smoothly.

5.1 User Interface Design

A **user interface** (UI) is the space where interactions between humans and machines occur. The goal of this interaction is to allow effective operation and control of the machine from the human end, whilst the machine simultaneously feeds back information that aids the operators' decision-making process. The goal of user interface design is to produce a user interface that makes it easy, efficient, and enjoyable (user-friendly) to operate a machine in the way which produces the desired result.

5.1.1 Splash Screen

This is the first thing that is visible to users while entering the website. It is used to cover up the delay caused by the on-Load methods and also for displaying the logo in general.

5.1.2 User SignUp UI

This is the UI design for the user registration where a user needs to enter the required credentials and the relevant data to build up his/her profile.

5.1.3 User Login UI

This is the interface for the user login where a user needs to enter his registered email address and password.

5.1.4 DashBoard UI

This is the first screen visible to the logged-in user where all the algorithm types and algorithms that are in trend are shown and the user can navigate to all the other activities through this activity.

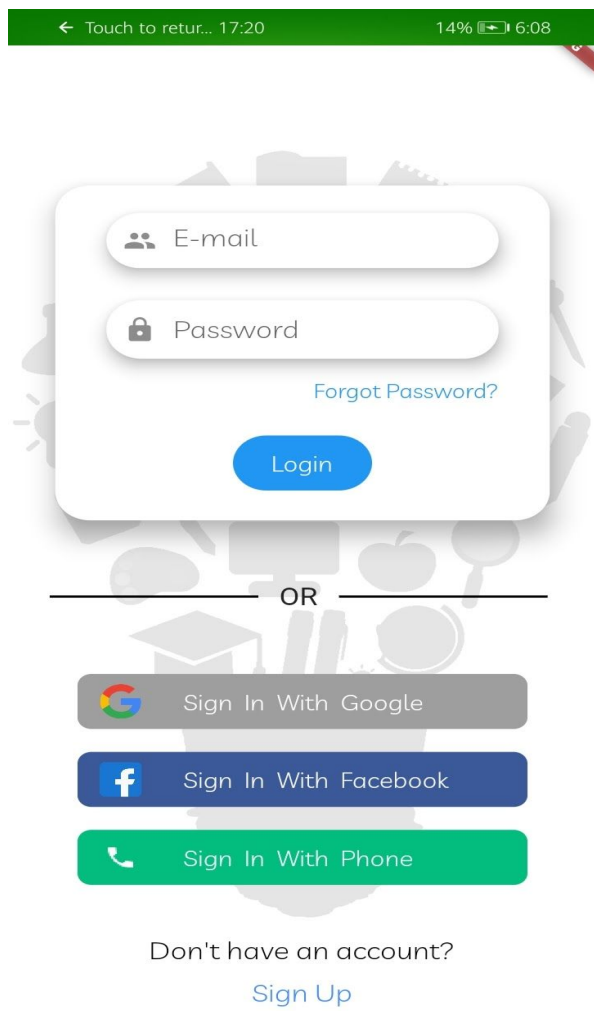
5.1.5 Studying Algo UI

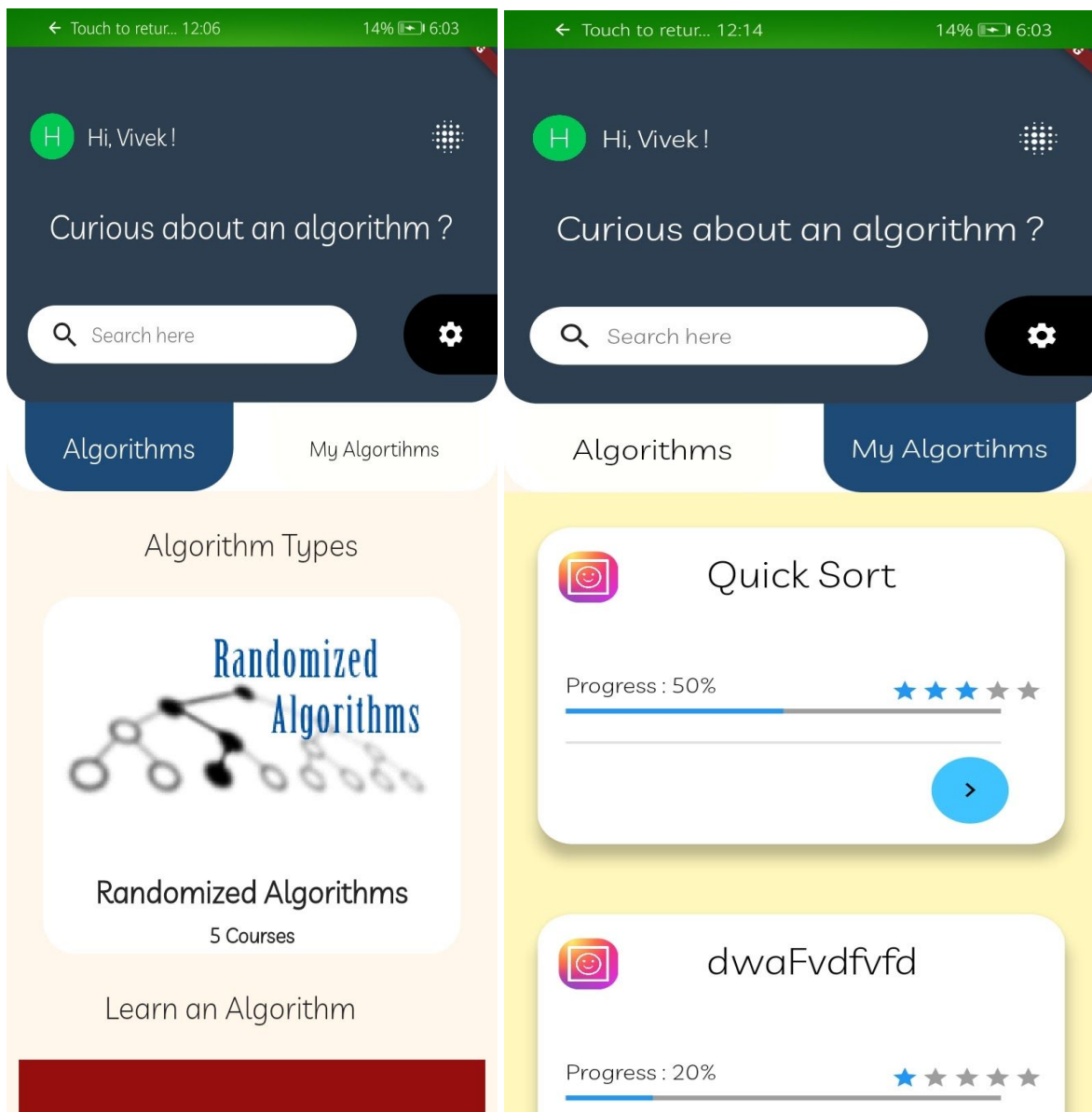
This is the screen where the related content i.e. explanations regarding the algo, its implementation in both major languages i.e. Java and Python come.

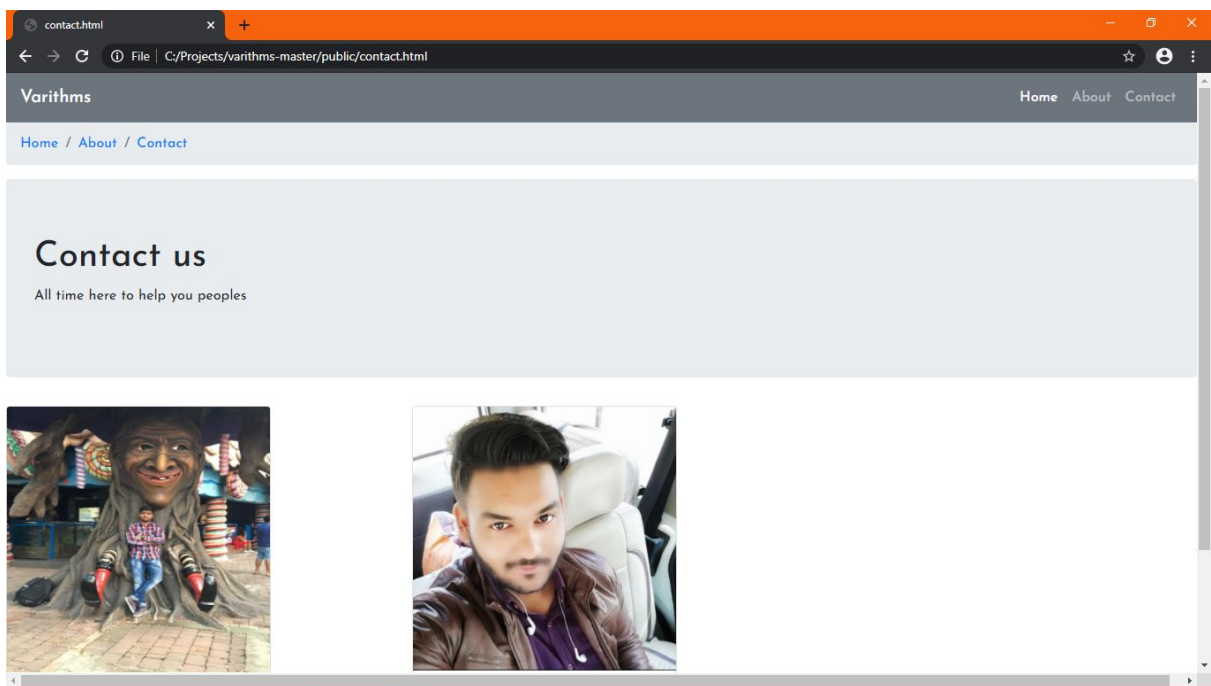
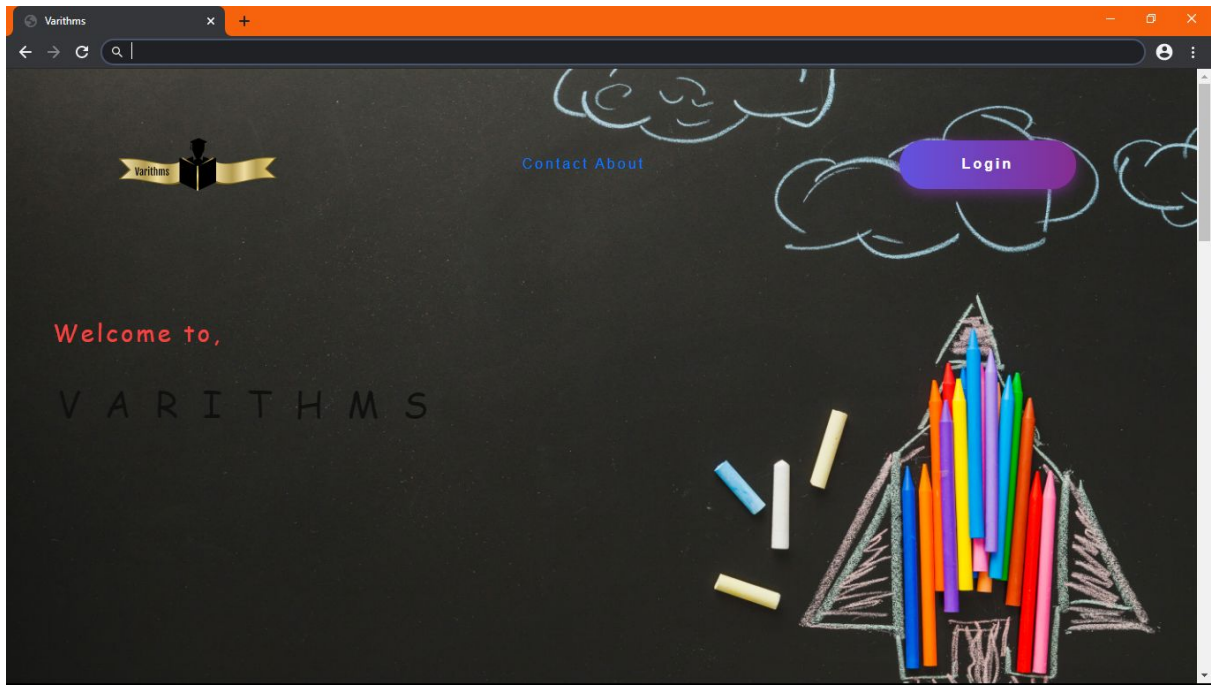
5.1.6 Profile Activity

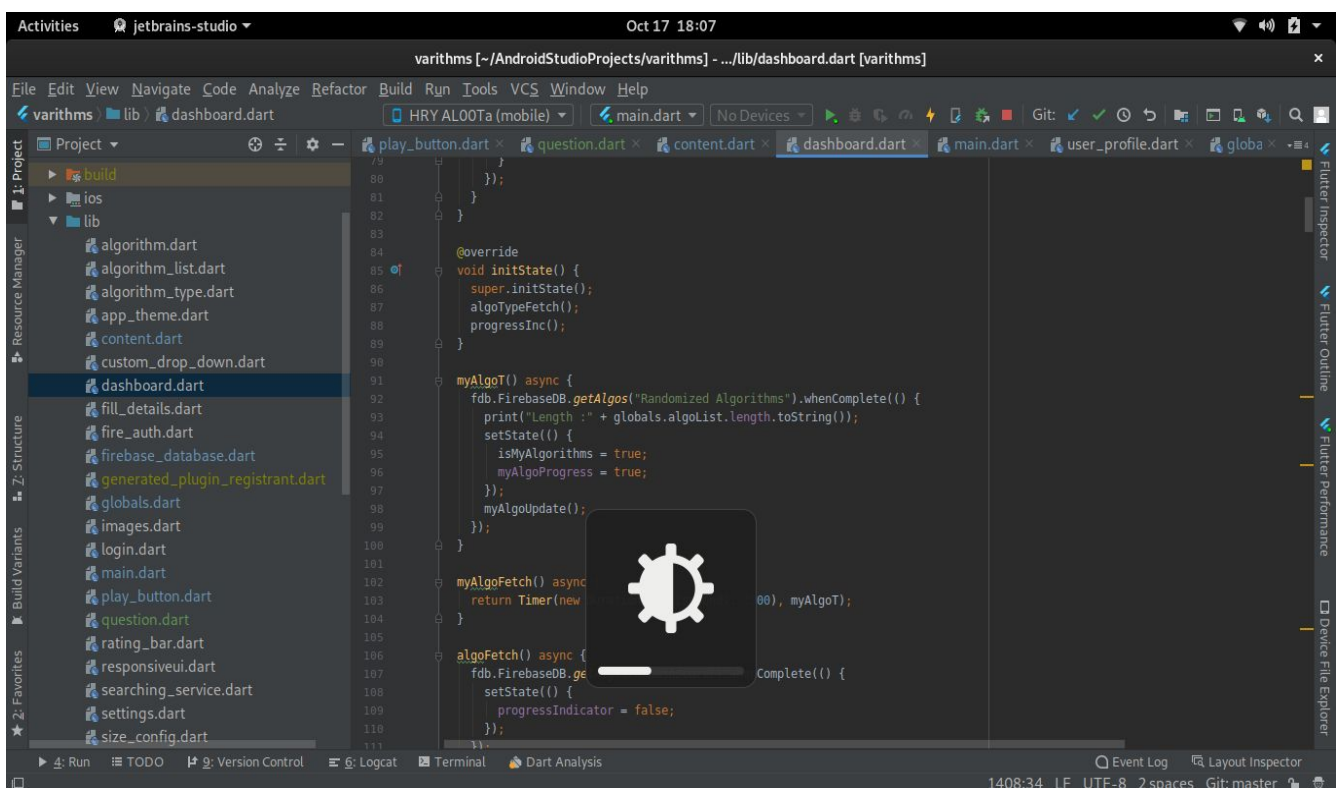
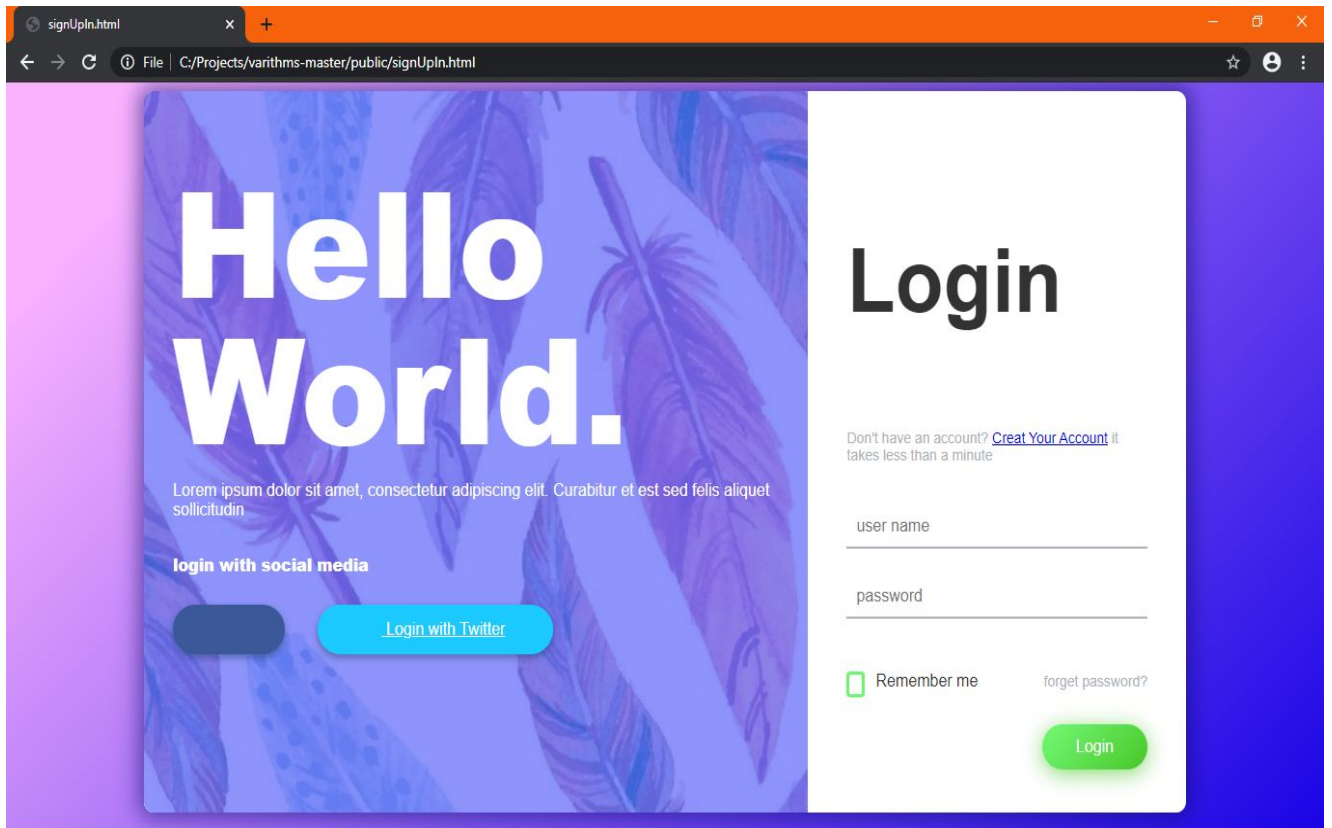
This is the design of the profile activity where all the algorithms studied by the user are shown, besides this, the number of algorithms up to now and the profile data is also shown.

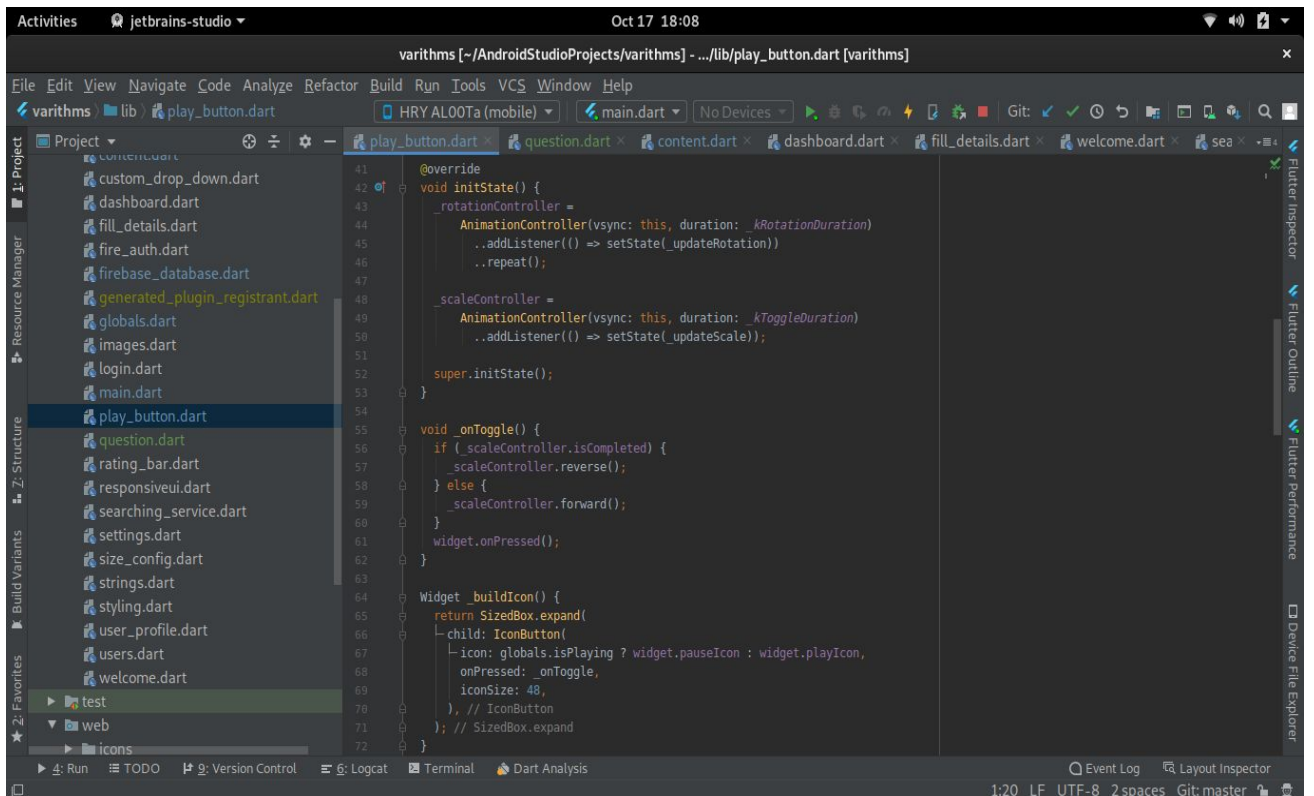
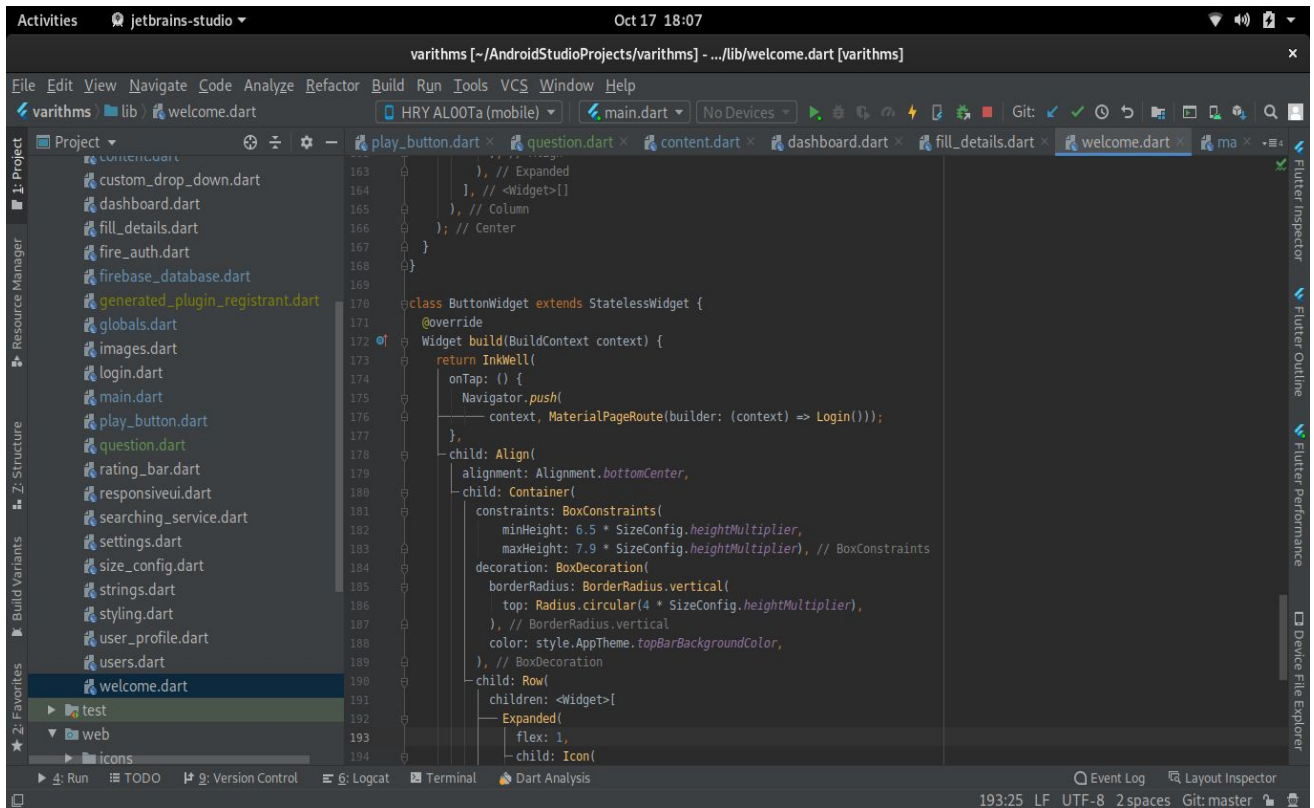
6. Some Screenshots









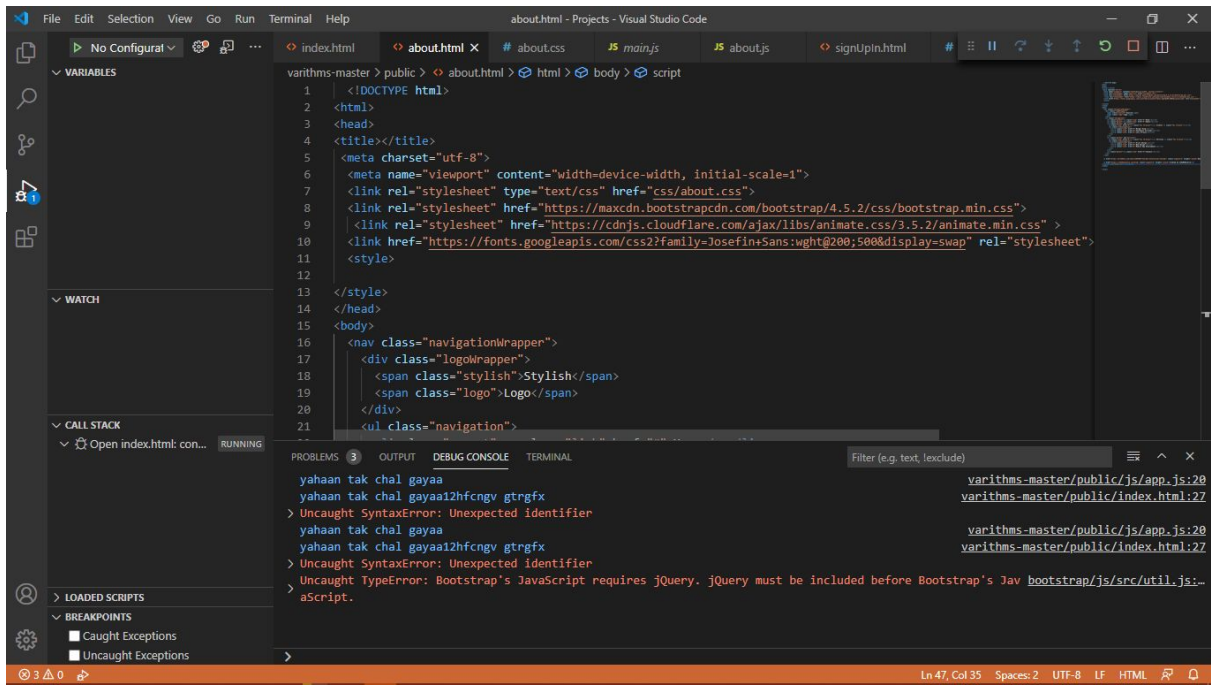


The screenshot shows an IDE window titled "varithms [-/AndroidStudioProjects/varithms] - .../lib/fill_details.dart [varithms]". The file explorer on the left shows a project structure with a "lib" directory containing various Dart files. The main editor displays the code for "fill_details.dart", which includes a dropdown menu and a text field. The code is as follows:

```
254 dropdownValue = newValue;
255 print(newValue);
256 });
257 },
258 items: <String>['Male', 'Female', 'Prefer not to say']
259 .map<cdd.DropdownMenuItem<String>>((String value) {
260   return cdd.DropdownMenuItem<String>{
261     value: value,
262     child: Text(value),
263   }; // cdd.DropdownMenuItem
264 }).toList(),
265 ), // cdd.DropdownButton
266 ), // Container
267 Container(
268   margin: EdgeInsets.only(left: 10, bottom: 10, right: 10),
269   child: TextField(
270     style: TextStyle(fontFamily: "Livvic"),
271     keyboardType: TextInputType.phone,
272     controller: phoneController,
273     decoration: InputDecoration(
274       prefixIcon: Icon(Icons.phone),
275       labelText: "Mobile",
276       labelStyle: TextStyle(fontFamily: "Livvic"),
277       contentPadding: EdgeInsets.all(5.0)), // InputDecoration
278   ), // TextField
279 ), // Container
280 Container(
281   width: 350,
282   margin: EdgeInsets.symmetric(horizontal: 10, vertical: 15),
283   child: cdd.DropdownButton<String>{
284     leftMargin: 130,
285     prefixIcon: Icon(
```

The screenshot shows an IDE window titled "varithms [-/AndroidStudioProjects/varithms] - .../lib/settings.dart [varithms]". The file explorer on the left shows a project structure with a "lib" directory containing various Dart files. The main editor displays the code for "settings.dart", which includes a text field and a container. The code is as follows:

```
330 width: MediaQuery
331   .of(context)
332   .size
333   .width,
334 child: Text("Mini Project III year", style: TextStyle(
335   color: Colors.gray, fontFamily: "Livvic", fontSize: 25,)), // TextStyle
336   textAlign: TextAlign.center,)), // Text
337 ), // Container
338 ), // Positioned
339 Positioned(
340   top: 780,
341   child: Container(
342     width: MediaQuery
343       .of(context)
344       .size
345       .width,
346     child: Text("Vstfz Tech Pvt Ltd", style: TextStyle(
347       color: Colors.gray, fontFamily: "Livvic", fontSize: 25,)), // TextStyle
348     textAlign: TextAlign.center,)), // Text
349 ), // Container
350 ), // Positioned
351 Positioned(
352   top: 800,
353   left: 0,
354   right: 0,
355   child: Container(
356     width: MediaQuery
357       .of(context)
358       .size
359       .width - 40,
360     margin: EdgeInsets.only(left: 20, right: 20),
361     height: 70,
362     decoration: BoxDecoration(
```



The screenshot shows the Visual Studio Code editor with the file `index.html` open. The editor is displaying the HTML structure of a web page, including the `<html>`, `<head>`, and `<body>` tags. The `<body>` tag contains a `div.container-fluid` element. The console output shows the following errors:

```
yahaan tak chal gayaa
yahaan tak chal gayaa12hfcngv gtrgfx
> Uncaught SyntaxError: Unexpected identifier
yahaan tak chal gayaa
yahaan tak chal gayaa12hfcngv gtrgfx
> Uncaught SyntaxError: Unexpected identifier
> Uncaught TypeError: Bootstrap's JavaScript requires jQuery. jQuery must be included before Bootstrap's JavaScript.
bootstrap/js/src/util.js:-
aScript.
```

The screenshot shows the Visual Studio Code editor with the file `signUp.html` open. The editor is displaying the HTML structure of a web page, including the `<html>`, `<head>`, and `<body>` tags. The `<body>` tag contains a `div.box-form` element. The console output shows the following errors:

```
yahaan tak chal gayaa
yahaan tak chal gayaa12hfcngv gtrgfx
> Uncaught SyntaxError: Unexpected identifier
yahaan tak chal gayaa
yahaan tak chal gayaa12hfcngv gtrgfx
> Uncaught SyntaxError: Unexpected identifier
> Uncaught TypeError: Bootstrap's JavaScript requires jQuery. jQuery must be included before Bootstrap's JavaScript.
bootstrap/js/src/util.js:-
aScript.
```

7.References

- Stack Overflow posts <https://stackoverflow.com/>
- Google's Firebase. <https://firebase.google.com/>