APTIDUDE

Report submitted in partial fulfilment of the requirement for the degree of

B.Tech.

in

Information Technology

Under the Supervision of :

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September 2018

DECLARATION

This is to certify that Report entitled *"AptiDude"* is submitted in partial fulfilment of the requirement for the award of degree B.Tech. in Information Technology to BPIT, GGSIP University, Delhi. It comprises only of our original work and due acknowledgement has been made in the text to all other material used.

Date:

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ACKNOWLEDGEMENT

There is always a sense of gratitude which one expresses towards others for their help and supervision in achieving the goals. This formal piece of acknowledgement is an attempt to express the feeling of gratitude towards people who were helpful in successful completion of this project.

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We would also like to take the opportunity to thank *Ms. Varsha Sharma*, *Industrial Training Coordinator* for her guidance and cooperation.

We are also grateful to the management and administration of Bhagwan Parshuram Institute of Technology for providing us with this opportunity to improve our skills and knowledge in the vast field of Information Technology.

AKSHITA AGGARWAL (00220803115)

ROHIT MEGHWAL (02720803115)

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She has completed a **Summer Training** of **"Advance Java & UI".** During the course of the training she demonstrated good skills and very enthusiastic with zeal to do her best.

She has excellent written and verbal communication skills and able to perform multiple task and bearing a good moral character also.

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This is to certify that Report entitled *"AptiDude"* which is submitted by *Akshita Aggarwal & Rohit Meghwal* in partial fulfilment of the requirement for the award of degree B.Tech. in Information Technology at Bhagwan Parshuram Institute of Technology, GGSIP University, Dwarka, Delhi is a record of the candidates' own work and the matter embodied in this report is adhered to the given format.

Date:

Ms. Varsha Sharma

(Coordinator)

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ABSTRACT

In today's world of great competition, every organization requires competent people. People with special abilities to find the solution to general problems quickly and effectively are in high demand in the industry of Information Technology. As the demand of organizations increases, the need for improvement in problem solving and general mental ability is also escalating for the aspirants.

AptiDude is an online portal for such aspirants to meet up the growing industry demands. AptiDude is a web app, a web portal that is not only informative but also interactive for the users. AptiDude helps the aspirants to evaluate, analyse and improve their reasoning, quantitative and qualitative abilities, all at one place. With an easy to use and interactive GUI, AptiDude allows aspirants to practice sets of questions in the multiple categories of 'Aptitude'.

As aspirants practice the questions by taking tests, they can keep track of their score and growth over the time. This is highly beneficial for the aspirants as it allows them to focus on the areas which need brushing up and it also allows them to better their areas of strength. It is suitable for anyone that aspires to go for either on-campus placements or off-campus placements as it aims at overall 'aptitude' empowerment.

The user first registers into the web app. Once registered successfully, user can log into his/her account to begin. The user can take tests or choose to look through questions of a particular topic of choice to practice anytime.

The portal is subdivided into various topics of the Level of Difficulty (LOD) applicable for placement aptitude tests. The tests are timed. However, the reference key to the questions is provided at the end of the tests. The more one practices, the better he/she gets at it. The complete focus of AptiDude is self-learning and growth of intellectual skills.

CHAPTER 1
INTRODUCTION

1.1 Web Application

Fig 1.1 Web Application

In computing, a web application or web app is a client–server computer program which the client (including the user interface and client-side logic) runs in a web browser. Common web applications include webmail, online retail sales, online auctions, wikis, instant messaging services and many other functions.[1]

Through Java, JavaScript, DHTML, Flash, Silverlight and other technologies, application-specific methods such as drawing on the screen, playing audio, and access to the keyboard and mouse are all possible. Many services have worked to combine all of these into a more familiar interface that adopts the appearance of an operating system. General purpose techniques such as drag and drop are also supported by these technologies. Web developers often use client-side scripting to add functionality, especially to create an interactive experience that does not require page reloading. Recently, technologies have been developed to coordinate client-side scripting with server-side technologies such as ASP.NET, J2EE, Perl/Plack and PHP.

Ajax, a web development technique using a combination of various technologies, is an example of technology which creates a more interactive experience.[2]

1.2 HTML5

Fig 1.2 HTML5-CSS3-JavaScript

HTML5 is the latest version of Hypertext Markup Language, the code that describes web pages. It's actually three kinds of code: HTML, which provides the structure; Cascading Style Sheets (CSS), which take care of presentation; and JavaScript, which makes things happen.[3]

HTML5 has been designed to deliver almost everything you'd want to do online without requiring additional software such as browser plugins. It does everything from animation to apps, music to movies, and can also be used to build incredibly complicated applications that run in your browser.

There's more. HTML5 isn't proprietary, so you don't need to pay royalties to use it. It's also cross-platform, which means it doesn't care whether you're using a tablet or a smartphone, a netbook, notebook or ultrabook or a Smart TV: if your browser supports HTML5, it should work flawlessly. Inevitably, it's a bit more complicated than that. More about that in a moment.

1.3 CSS3

CSS3 is the latest evolution of the Cascading Style Sheets language and aims at extending CSS2.1. It brings a lot of long-awaited novelties, like rounded corners, shadows, gradients, transitions or animations, as well as new layouts like multi-columns, flexible box or grid layouts. Experimental parts are vendor-prefixed and should either be avoided in production environments, or used with extreme caution as both their syntax and semantics can change in the future.[4]

1.4 JavaScript

Javascript is a dynamic computer programming language. It is lightweight and most commonly used as a part of web pages, whose implementations allow client-side script to interact with the user and make dynamic pages. It is an interpreted programming language with object-oriented capabilities.

JavaScript was first known as LiveScript, but Netscape changed its name to JavaScript, possibly because of the excitement being generated by Java. JavaScript made its first appearance in Netscape 2.0 in 1995 with the name LiveScript. The general-purpose core of the language has been embedded in Netscape, Internet Explorer, and other web browsers.[6]

The ECMA-262 Specification defined a standard version of the core JavaScript language:

-JavaScript is a lightweight, interpreted programming language.

-Designed for creating network-centric applications.

-Complementary to and integrated with Java.

-Complementary to and integrated with HTML.

-Open and cross-platform

1.5 J2EE

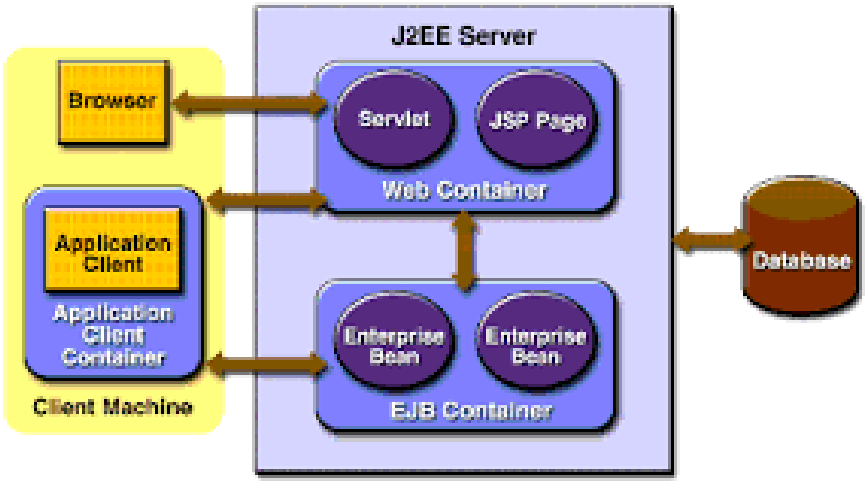

Fig 1.3 J2EE

J2EE is a platform-independent, Java-centric environment from Sun for developing, building and deploying Web-based enterprise applications online. The J2EE platform consists of a set of services, APIs, and protocols that provide the functionality for developing multi tiered, Web-based applications.[5]

Some of the key features and services of J2EE:

- At the client tier, J2EE supports pure HTML, as well as Java applets or applications. It relies on Java Server Pages and servlet code to create HTML or other formatted data for the client.
- Enterprise JavaBeans (EJBs) provide another layer where the platform's logic is stored. An EJB server provides functions such as threading, concurrency, security and memory management. These services are transparent to the author.
- Java Database Connectivity (JDBC), which is the Java equivalent to ODBC, is the standard interface for Java databases.
- The Java servlet API enhances consistency for developers without requiring a graphical user interface.

1.6 Apache Tomcat Server

Apache Tomcat is an open source Web server tool developed by the Apache Software Foundation (ASF). It is one of many Apache-related open source products used by IT professionals for various tasks and objectives.

Apache Tomcat allows the implementation of Java Servlets and JavaServer Pages (JSP) to promote an effective Java server environment. Users can also access resources for configuration and use extensible markup language (XML) to configure projects. Successive versions of Apache Tomcat have solved different problems by applying software patches and other solutions. Some experts characterize Apache Tomcat as a product offering a runtime shell for Java Servlets. Users can also set up Java virtual machines (JVM) to configure virtual hosting.

1.7 PostgreSQL

Fig 1.4 PostgreSQL

PostgreSQL (pronounced "post-gress-Q-L") is an open source relational database management system (DBMS) developed by a worldwide team of volunteers. PostgreSQL is not controlled by any corporation or other private entity and the source code is available free of charge.[7]

PostgreSQL supports transaction s, subselects, trigger s, view s, foreign key referential integrity, and sophisticated locking. It runs on numerous platforms including Linux , most flavors of UNIX , Mac OS X , Solaris , Tru64, and Windows . It supports text, images, sounds, and video, and includes programming interfaces for C / C++ , Java , Perl , Python , Ruby, Tcl and Open Database Connectivity (ODBC).

CHAPTER-2

SOFTWARE REQUIREMENT SPECIFICATIONS

2.1 INTRODUCTION

A Software Requirements Specification (SRS) is a document that describes the nature of a project, software or application. In simple words, SRS document is a manual of a project provided it is prepared before you kick-start a project/application. There are a set of guidelines to be followed while preparing the software requirement specification document. This includes the purpose, scope, specific requirements like functional and non-functional requirements, software and hardware requirements of the project. In addition to this, it also contains the information about environmental conditions required, safety and security requirements, software quality attributes of the project etc.

2.11 Purpose

This project hopes to include or use most of the features available in Java Enterprise Edition (J2EE). It is a simple looking yet effective web app that uses most of the functions and technologies provided by the J2EE package. The purpose of developing this web app is to create an easy to use portal that helps campus placement aspirants to brush up and improve their mental and reasoning skills to perform better in their placement tests.[8]

The objective of AptiDude is to help students prepare for placement drives. While making this project we ensure to keep a strong command over our subject and maintain its dignity. The main purpose of this SRS document is to illustrate the requirements of the project AptiDude.

2.12 Technologies Used

Operating System : Windows 10 Pro

Front End : HTML5/CSS3, JavaScript, Bootstrap

Back End : Java, JSP, JavaScript

IDE : Eclipse Photon, Visual Studio Code

Server : Apache Tomcat Server 8.0

Database : PostgreSQL 10.x

2.13 The Overview

The rest of this SRS is organized as follows:

- It gives an overall description of the Application. It gives what level of proficiency is expected of the user, some general constraints while making the Application.
- It gives specific requirements which the Application is expected to deliver. Some performance requirements and constraints are also given and deal with other Non-Functional Requirements.
- It deals with External Interface Requirements like Hardware and Software Interface.

2.2 THE OVERALL DESCRIPTION

2.21 Product Perspective

1. The application **AptiDude** is aiming to provide empowerment of mental aptitude to campus placement aspirants. Interface is user-friendly and interactive.
2. **AptiDude** is intended to be a stand-alone product and should not depend on the availability of other systems. The system will also have an administrator who has full-fledged rights with regards to performing all actions related to administering the application.

2.22 Product Features

- Application installation is not required.
- Users can access the application on web anytime and anywhere.
- Updates and upgrades to newer versions are automatic.
- Any computer with an internet connection can become an access point to the application and test their aptitude.
- The user can see their points and assess their aptitude .

-

2.23 User Classes and Characteristic

There are mainly two kinds of users for the product. The users include:

1. Administrator
2. End-User

The features that are available to the Administrator are:

- View the question pool.
- Add, update or delete the data in the question pool.

The features that are available to the End-User are:

- View and update the profile.
- Take aptitude tests.
- View questions topic-wise.

2.24 Operating Environment

Software Requirements:

AptiDude will operate on a web browser. All it requires for running at client end is a working internet connection and a web browser. It is cross browser i.e. it can work on most of the web browsers including Internet Explorer, Mozilla Firefox, Google Chrome. Any web browser supporting HTML5 and Bootstrap will work.

Hardware Requirements:

Any device like laptops, computers, tablets and mobile which can allow the above said web browser's setup on them are good to run this application.

2.25 Design and Implementation Constraints

- Currently, the application cannot be installed on mobile phone.
- The application is programmed completely on the server side unlike, the applications in trend which allow client side scripting that helps in managing large amount of data.

.

2.26 Assumptions & Dependencies

1. Administrator is created in the system or by the admin itself.
2. Roles and tasks are predefined.
3. Every user must be comfortable with using a computer.
4. All operations are in English so user must have basic knowledge of English.

2.3 FUNCTIONAL REQUIREMENTS

The Administrator will be given more powers (addition/deletion/ update) than other users. It will be ensured that the information entered is of the correct format. For example name cannot contain numbers. The system can be accessed anytime.

2.4 NON FUNCTIONAL REQUIREMENTS

2.41 Performance Requirements

The proposed system that we are going to develop will be used as a web application system and as an interactive and easy-to-use concept in order to make aspirants brush up their mental aptitude and reasoning skills. It will help in teaching organisation by conducting such activities for students.

2.42 Safety Requirements

The database may get crashed at any certain time due to virus or operating system failure. Therefore, it is required to take the database backup.

Also, nobody should be able to access or manipulate each other's data.

2.43 Security Requirements

1. We are going to develop a secured database. There are different categories of users namely Administrator and End-User who will be viewing either all or some specific information from the database.

2. Depending upon the category of user the access rights are decided. It means if the user is an administrator then he can be able to modify the data, append etc. All other users only have the rights to retrieve the information about database.

2.44 Software Quality Attributes

The quality attributes provided by our application: Reusability, Reliability, Availability, Maintainability, Flexibility, Robustness, Platform Independent.

2.5 SOFTWARE REQUIREMENTS

2.51 Operating Environment

Windows 10 is a personal computer operating system developed and released by Microsoft as part of the Windows NT family of operating systems. It was first released on July 29, 2015. Unlike previous versions of Windows, Microsoft has branded Windows 10 as a "service" that receives ongoing "feature updates".

2.52 SDLC Description

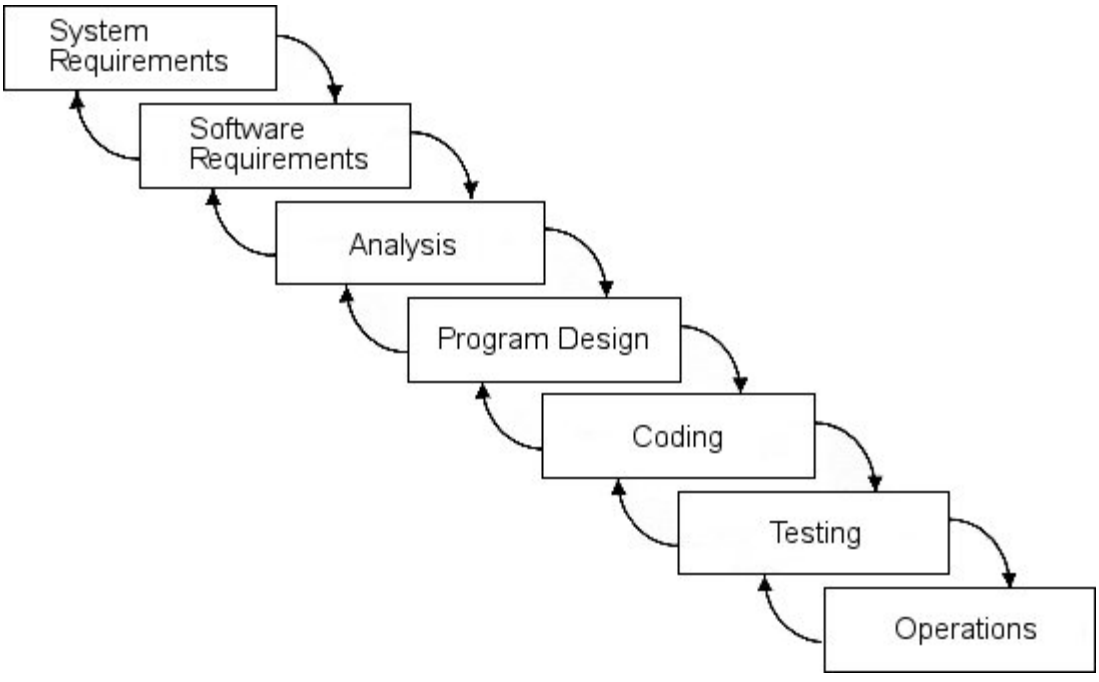

Fig 2.1 Waterfall Model[9]

SDLC stands for Software Development Life Cycle. It helps in assessing what approach was used to create a particular software or application. Every software needs to have a kind of approach, a set of requirements from the client or a problem statement. This gives an aim and vision to the developer. Waterfall Model also referred to as linear sequential life cycle model, is a very simple to implement and easy to understand and use software development life cycle. Here, each phase must be completed before the next phase can begin and there is no overlapping in the phases. This life cycle is used when there is no ambiguity in the software requirements and they are also not dynamic. The project has to be short and there is ample of expertise available to support the product. However it helps in arranging the tasks. We used this model for our implementation because of all the advantages mentioned above.[10]

2.53 Software Interface

Eclipse: It is an integrated development environment (IDE) used in computer programming, and is the most widely used Java IDE. It contains a base workspace and an extensible plug-in system for customizing the environment. Eclipse is written mostly in Java and its primary use is for developing Java applications, but it may also be used to develop applications in other programming languages via plug-ins. It can also be used to develop documents with LaTeX (via a TeXlipse plug-in) and packages for the software Mathematica. Development environments include the Eclipse Java development tools (JDT) for Java and Scala, Eclipse CDT for C/C++, and Eclipse PDT for PHP, among others. Eclipse software development kit (SDK) is free and open-source software, released under the terms of the Eclipse Public License, although it is incompatible with the GNU General Public License.

PostgreSQL: PostgreSQL, often simply Postgres, is an object-relational database management system (ORDBMS) with an emphasis on extensibility and standards compliance. It can handle workloads ranging from small single-machine applications to large Internet-facing applications (or for data warehousing) with many concurrent users; on macOS Server, PostgreSQL is the default database; and it is also available for Microsoft Windows and Linux (supplied in most distributions).

Apache Tomcat Server: Apache Tomcat, often referred to as Tomcat Server, is an open-source Java Servlet Container developed by the Apache Software Foundation (ASF). Tomcat implements several Java EE specifications including Java Servlet, Java Server Pages (JSP), and provides a "pure Java" HTTP web server environment in which Java code can run.

Tomcat is developed and maintained by an open community of developers under the auspices of the Apache Software Foundation, released under the Apache License 2.0 license, and is open-source software.

Catalina is Tomcat's servlet container. Catalina implements Sun Microsystems's specifications for servlet and Java Server Pages (JSP). In Tomcat, a Realm element represents a "database" of usernames, passwords, and roles (similar to Unix groups) assigned to those users. Different implementations of Realm allow Catalina to be integrated into environments where such authentication information is already being created and maintained, and then use that information to implement Container Managed Security as described in the Servlet Specification.

Coyote is a Connector component for Tomcat that supports the HTTP 1.1 protocol as a web server. This allows Catalina, nominally a Java Servlet or JSP container, to also act as a plain web server that serves local files as HTTP documents. Coyote listens for incoming connections to the server on a specific TCP port and forwards the request to the Tomcat Engine to process the request and send back a response to the requesting client.

Jasper is Tomcat's JSP Engine. Jasper parses JSP files to compile them into Java code as servlets (that can be handled by Catalina). At runtime, Jasper detects changes to JSP files and recompiles them.

As of version 5, Tomcat uses Jasper 2, which is an implementation of the Sun Microsystems's JSP 2.0 specification. From Jasper to Jasper 2, important features were added:

- JSP Tag library pooling - Each tag markup in JSP file is handled by a tag handler class. Tag handler class objects can be pooled and reused in the whole JSP servlet.

- Background JSP compilation - While recompiling modified JSP Java code, the older version is still available for server requests. The older JSP servlet is deleted once the new JSP servlet has finished being recompiled.
- Recompile JSP when included page changes - Pages can be inserted and included into a JSP at runtime. The JSP will not only be recompiled with JSP file changes but also with included page changes.

2.54 Programming Languages

J2EE: Java Platform, Enterprise Edition (Java EE), formerly Java 2 Platforms, Enterprise Edition (J2EE), currently Jakarta EE, is a set of specifications, extending Java SE with specifications for enterprise features such as distributed computing and web services. Java EE applications are run on reference runtimes, that can be microservices or application servers, which handle transactions, security, scalability, concurrency and management of the components it is deploying.[4]

Examples of contexts in which Java EE referencing runtimes are used are: e-commerce, accounting, banking information systems.

SQL : SQL stands for Structured Query Language. SQL is used to communicate with a database. According to ANSI (American National Standards Institute), it is the standard language for relational database management systems. SQL statements are used to perform tasks such as update data on a database, or retrieve data from a database. Some common relational database management systems that use SQL are: Oracle, Sybase, Microsoft SQL Server, Access, Ingres, etc.

2.6 CONCLUSION

This SRS has given all the details of the application need to be built and to be used in efficiently as well as effectively.

CHAPTER 3

DIAGRAMS

3.1 Three Tier Web Architecture

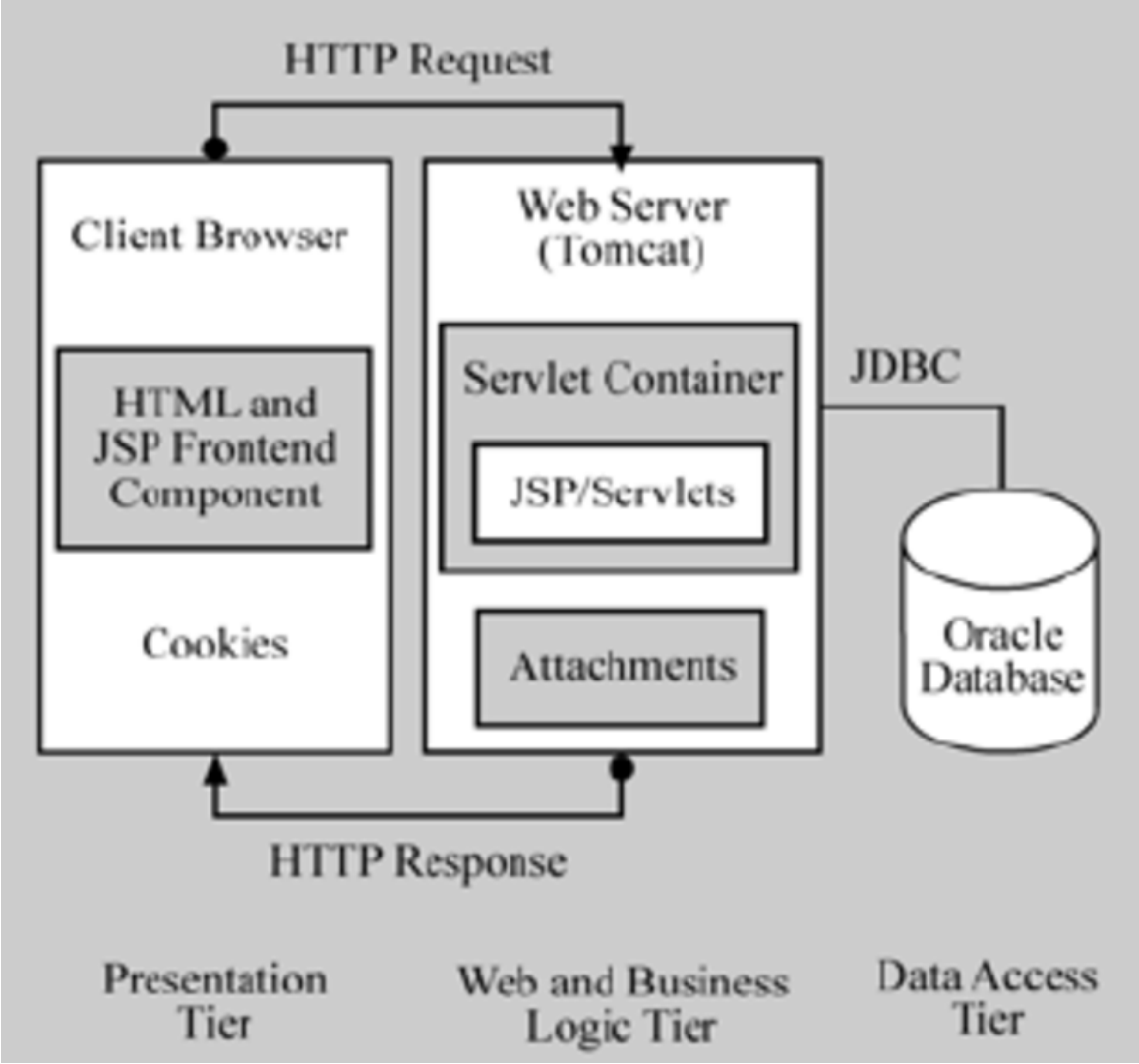

Fig 3.1 Three Tier Web Architecture[1]

3.2 Entity-Relationship Diagram

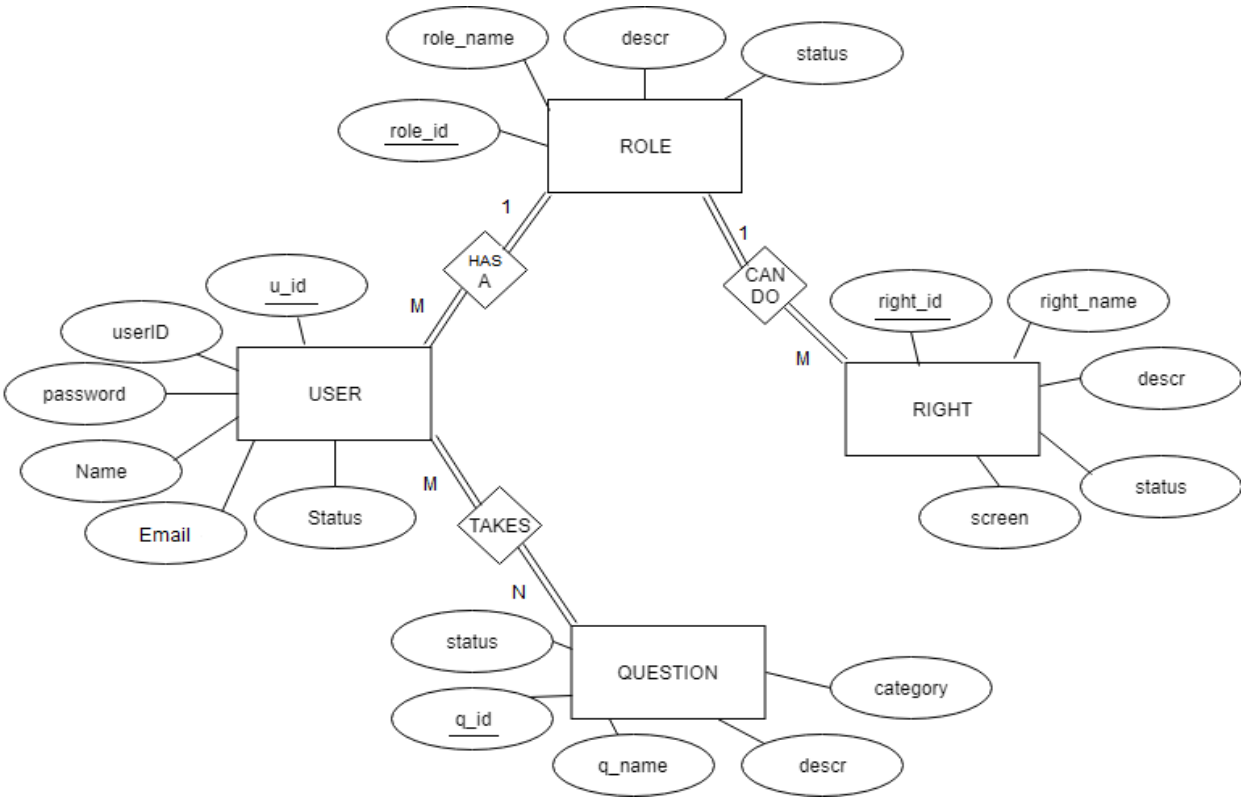

Fig 3.2 E-R Diagram

3.3 Data Flow Diagrams

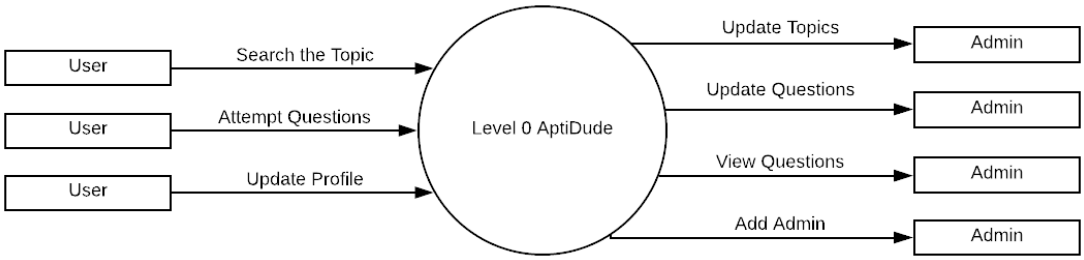

Fig 3.3 Level 0 DFD

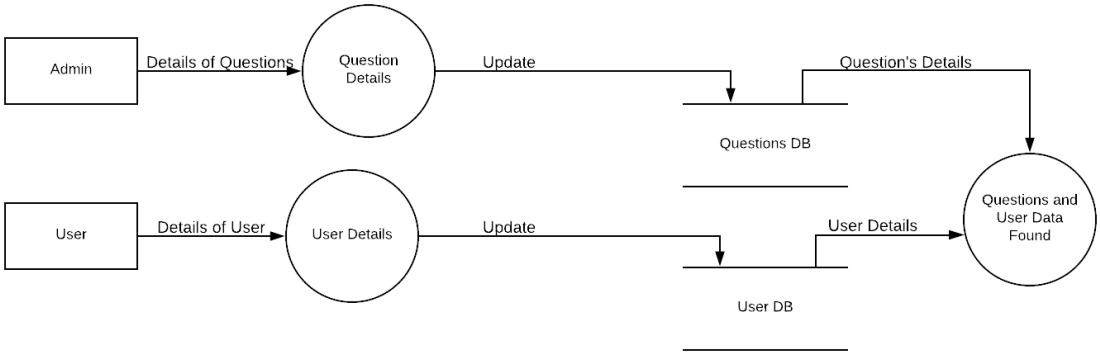

Fig 3.4 Level 1 DFD

3.4 Use-Case Diagram

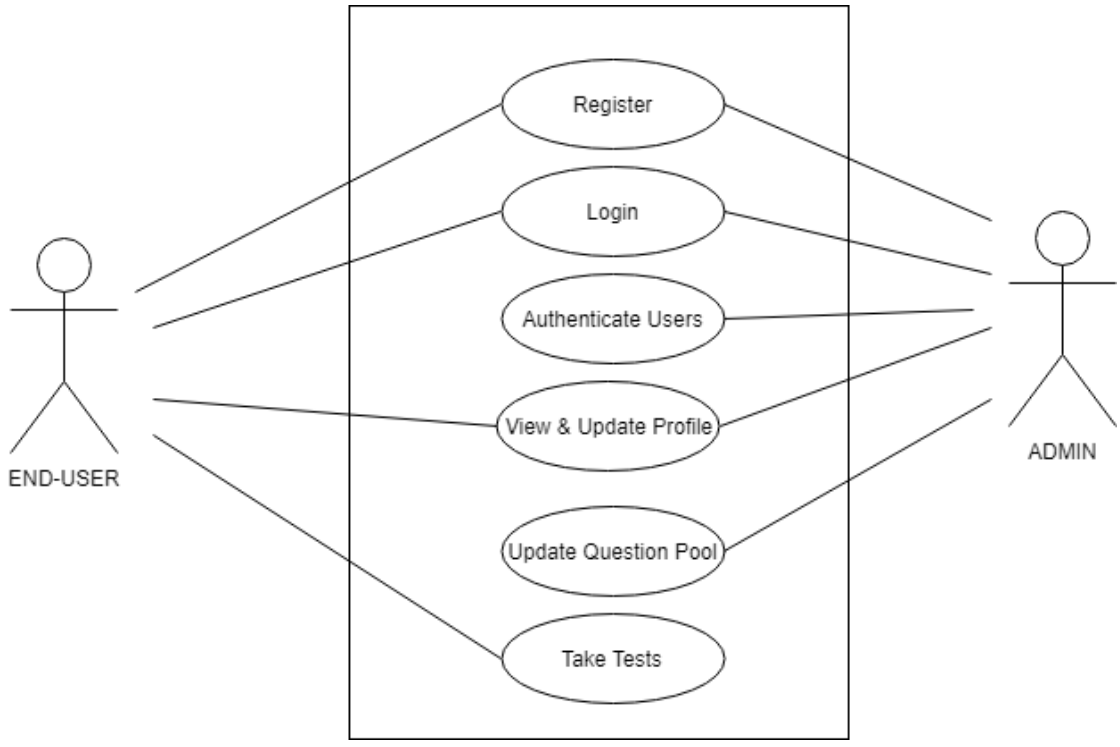

Fig 3.5 Use Case Diagram

CHAPTER 4

PROCESS SELECTION

4.1 JAVA

Java is a programming language and a platform independent language. Java is a high level, robust, secured and object-oriented programming language.

4.11 Platform Independent

Any hardware or software environment in which a program runs, is known as a platform. Since Java has its own runtime environment (JRE) and API, it is called platform.

4.12 Simple

Java language is simple because syntax is based on C++ (so easier for programmers to learn it after C++). Java has removed many confusing and/or rarely-used features e.g., explicit pointers, operator overloading etc. No need to remove unreferenced objects because there is Automatic Garbage Collection in java.

4.13 Secured

Java is secured because:

- No explicit pointer
- Java Programs run inside virtual machine sandbox
- Classloader: adds security by separating the package for the classes of the local file system from those that are imported from network sources.
- Bytecode Verifier: checks the code fragments for illegal code that can violate access right to objects.
- Security Manager: determines what resources a class can access such as reading and writing to the local disk.
- These security are provided by java language. Some security can also be provided by application developer through SSL, JAAS, Cryptography etc.

4.14 Robust

Robust simply means strong. Java uses strong memory management. There are lack of pointers that avoids security problem. There is automatic garbage collection in java. There is exception handling and type checking mechanism in java. All these points makes java robust.

4.15 Portable

We may carry the java bytecode to any platform. It also means that it can be accessed anytime anywhere. The carrying of the code is not required. Portability here means the ease of access around the world.[11]

4.2 JVM

JVM (Java Virtual Machine) is an abstract machine. It is a specification that provides runtime environment in which java bytecode can be executed. [11] JVMs are available for many hardware and software platforms. The JVM performs following main tasks:

- Loads code
- Verifies code
- Executes code
- Provides runtime environment

4.3 JRE

JRE is an acronym for Java Runtime Environment. It is used to provide runtime environment. It is the implementation of JVM. It physically exists. It contains set of libraries & other files that JVM uses at runtime. Implementation of JVMs are also actively released by other companies besides Sun MicroSystems.[11]

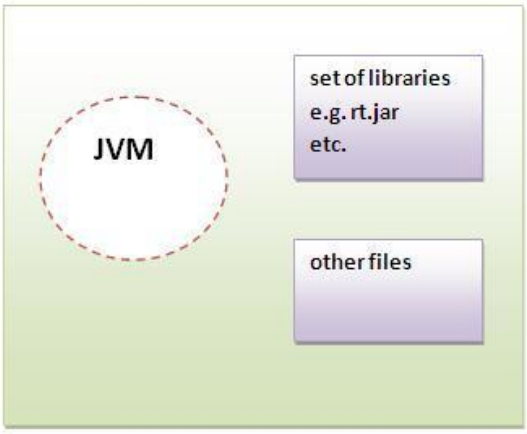

Fig.4.1 JRE

4.4 JDK

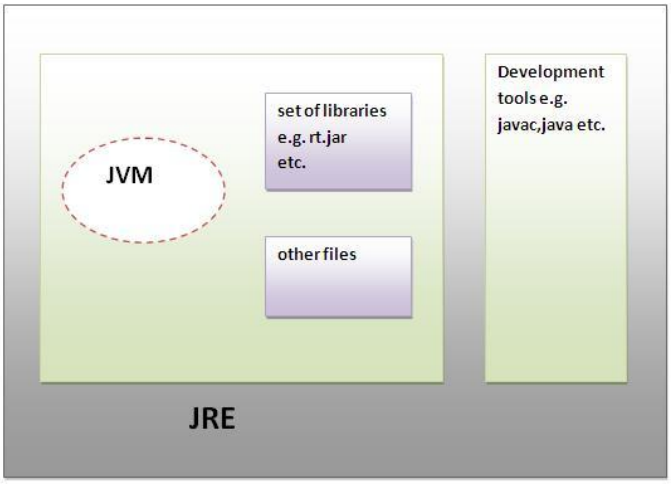

Fig.4.2 JDK

JDK is an acronym for Java Development Kit.It physically exists.It contains JRE & development tools. The JDK includes tools useful for developing and testing programs written in the Java programming language and running on the Java platform.[11]

4.5 Eclipse IDE

Fig 4.3 Eclipse Photon

Eclipse is an integrated development environment (IDE) used in computer programming, and is the most widely used Java IDE. It contains a base workspace and an extensible plug-in system for customizing the environment. Eclipse is written mostly in Java and its primary use is for developing Java applications, but it may also be used to develop applications in other programming languages via plug-ins. It can also be used to develop documents with LaTeX (via a TeXlipse plug-in) and packages for the software Mathematica. Development environments include the Eclipse Java development tools (JDT) for Java and Scala, Eclipse CDT for C/C++, etc among others.

Eclipse software development kit (SDK) is free and open-source software, released under the terms of the Eclipse Public License, although it is incompatible with the GNU General Public License. It was one of the first IDEs to run under GNU Classpath and it runs without problems under IcedTea.

4.6 Apache Tomcat Server

Apache Tomcat, often referred to as Tomcat Server, is an open-source Java Servlet Container developed by the Apache Software Foundation (ASF). Tomcat implements several Java EE specifications including Java Servlet, JavaServer Pages (JSP), Java EL, and WebSocket, and provides a "pure Java" HTTP web server environment in which Java code can run. Tomcat is developed and maintained by an open community of developers under the auspices of the Apache Software Foundation, released under the Apache License 2.0 license, and is open-source software.

CHAPTER 5

RESULTS

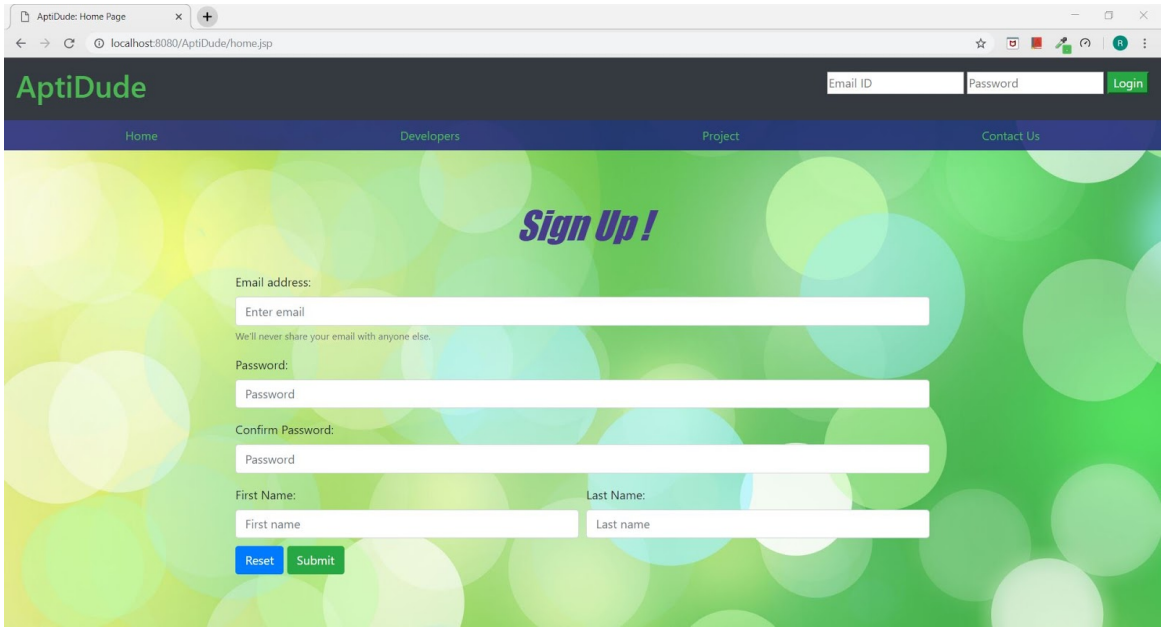

Fig 5.1 Home Screen

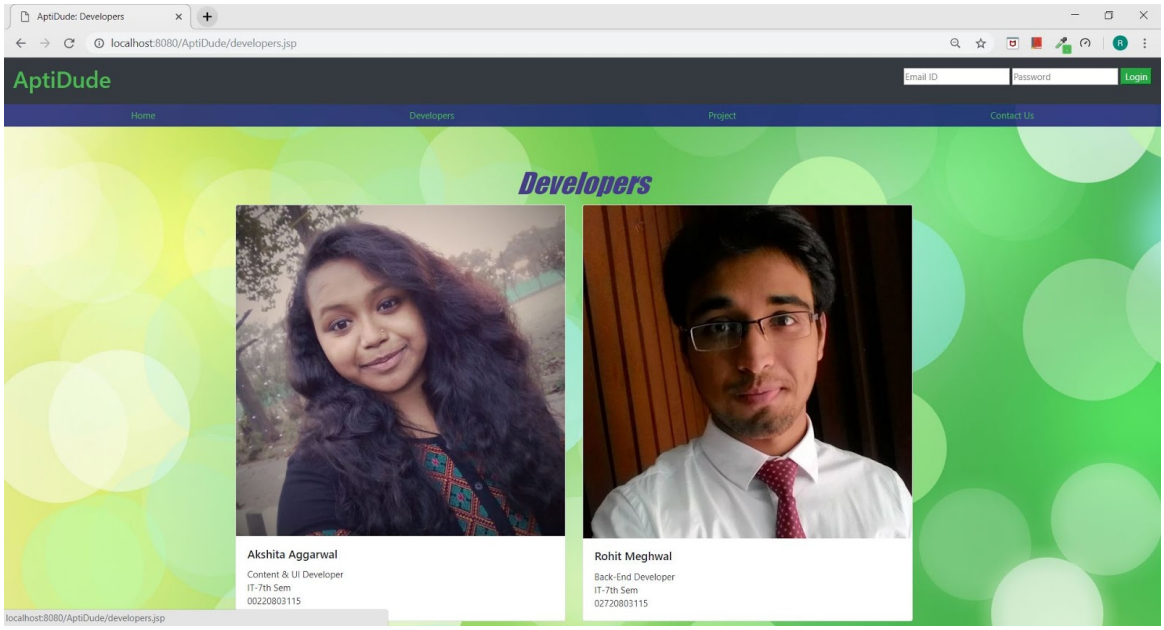

Fig 5.2 Developers Screen

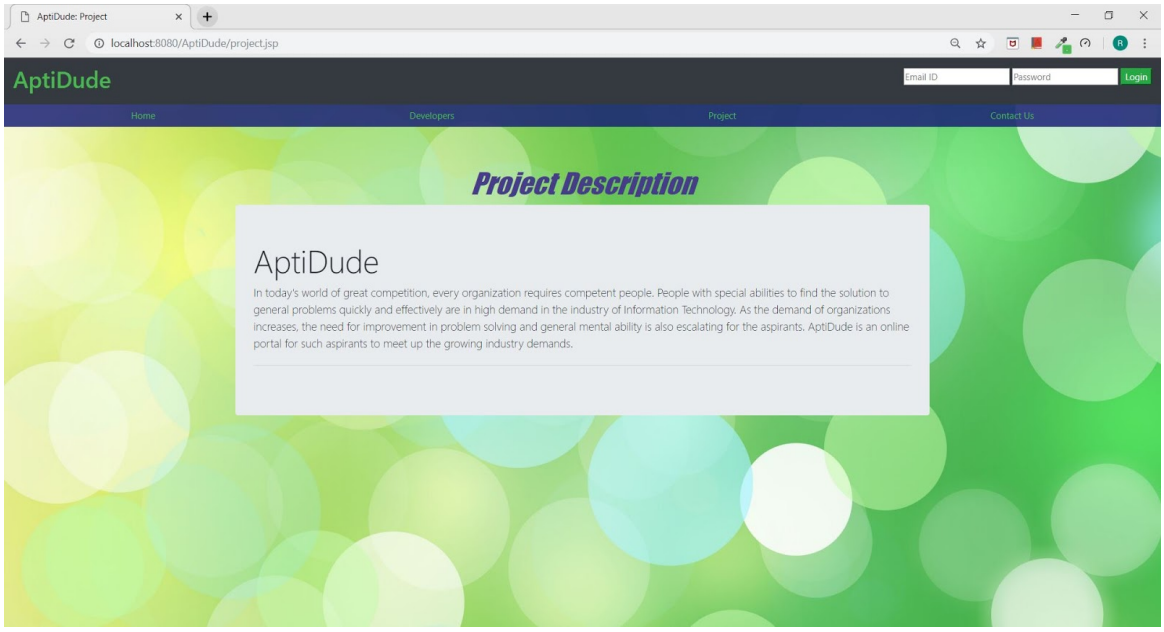

Fig 5.3 Project Description Screen

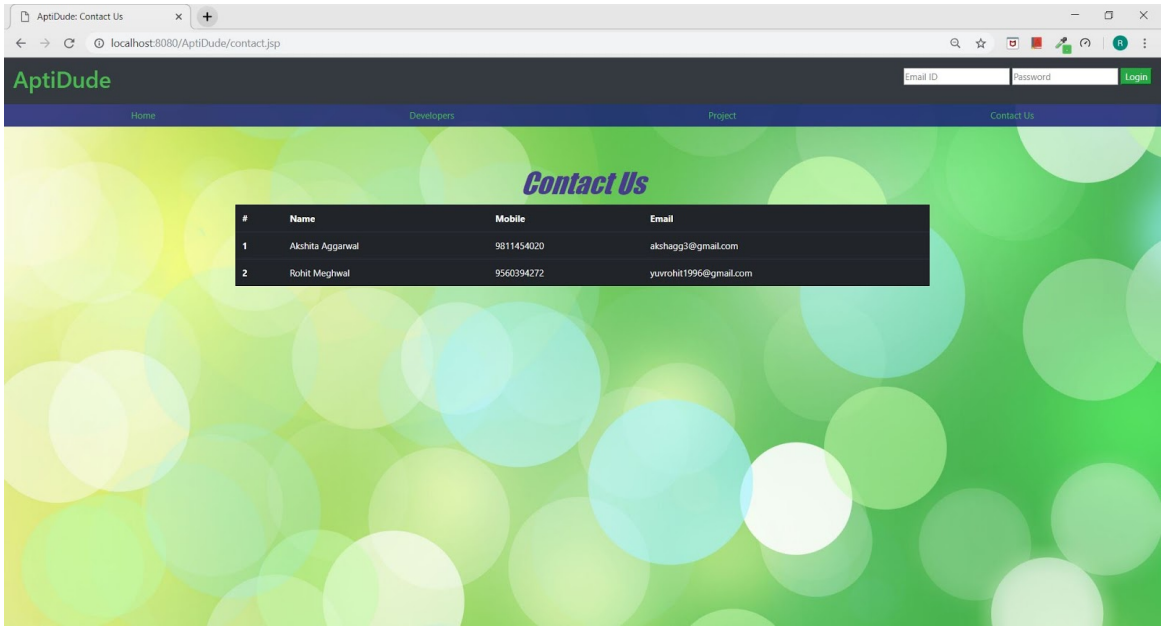

Fig 5.4 Contact Us Screen

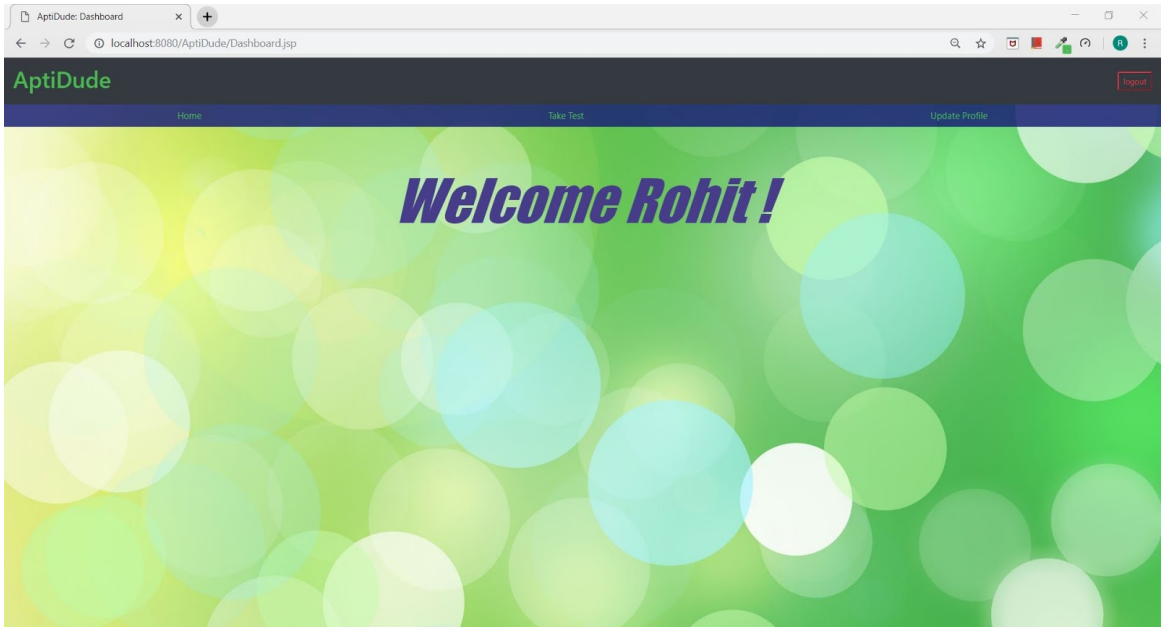

Fig 5.5 Login Home Screen

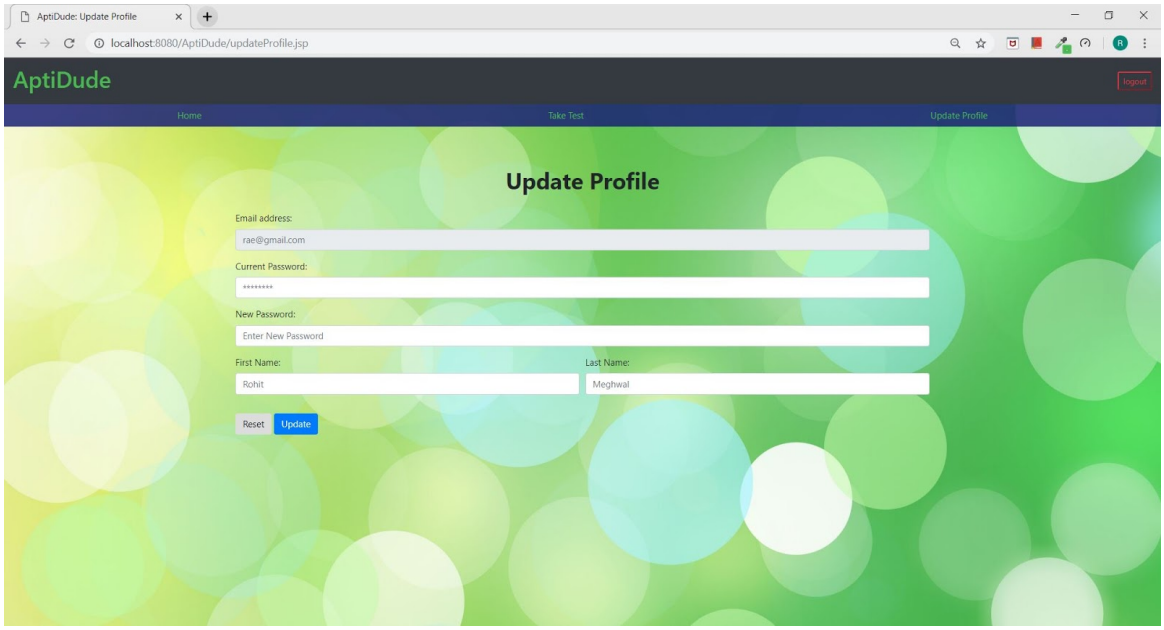

Fig 5.6 Update Profile Screen

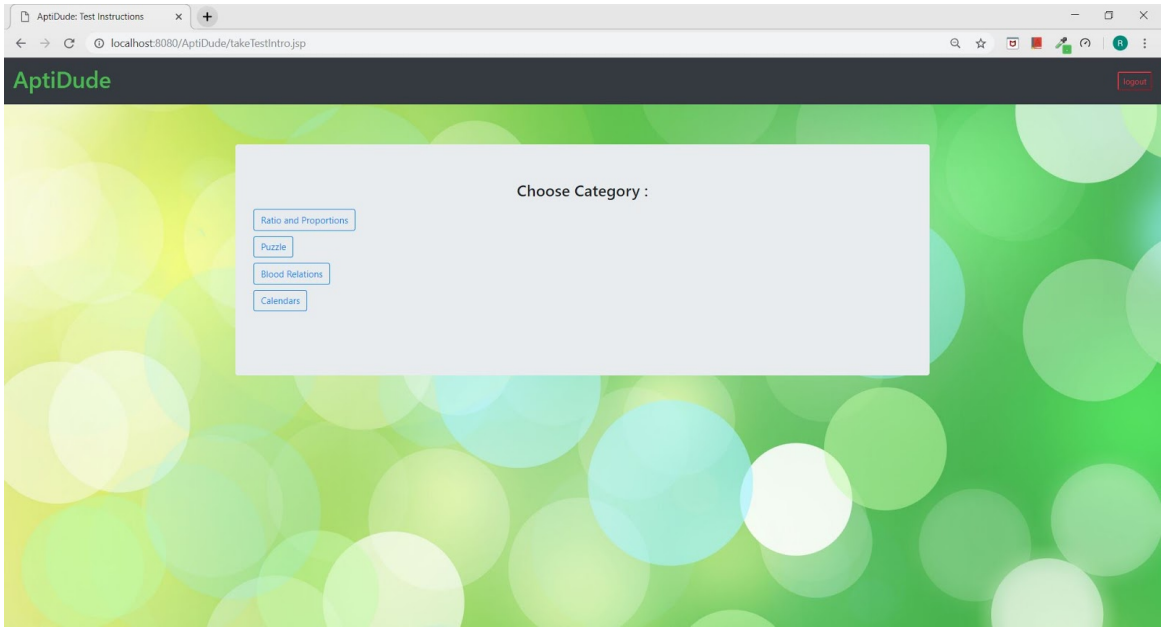

Fig 5.7 Test Intro Screen

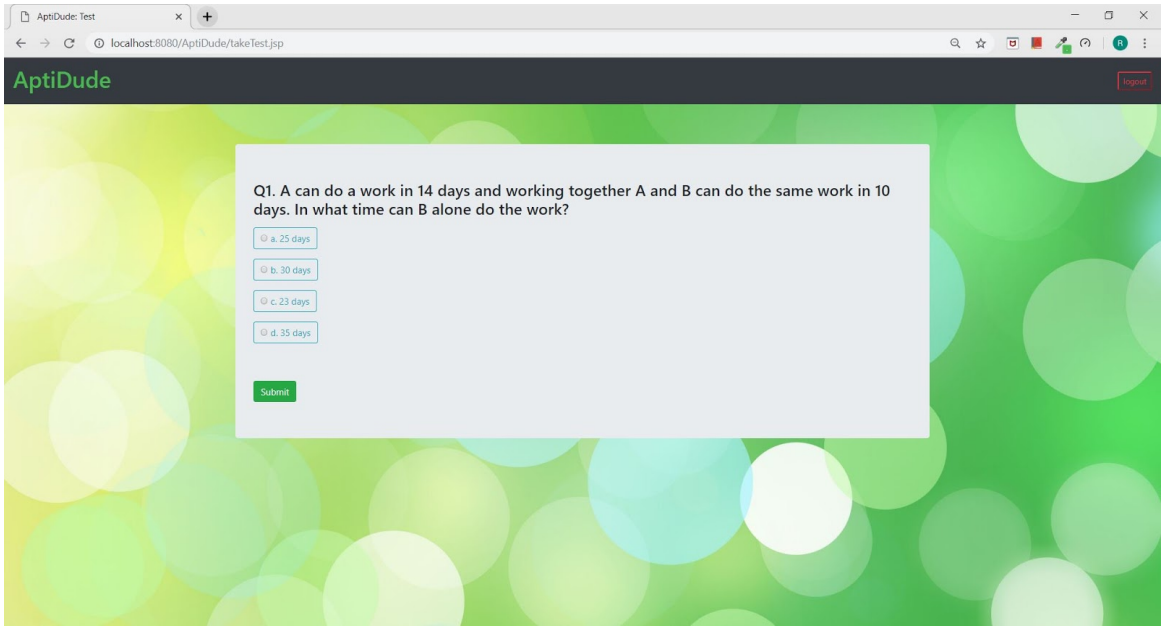

Fig 5.8 Question Screen

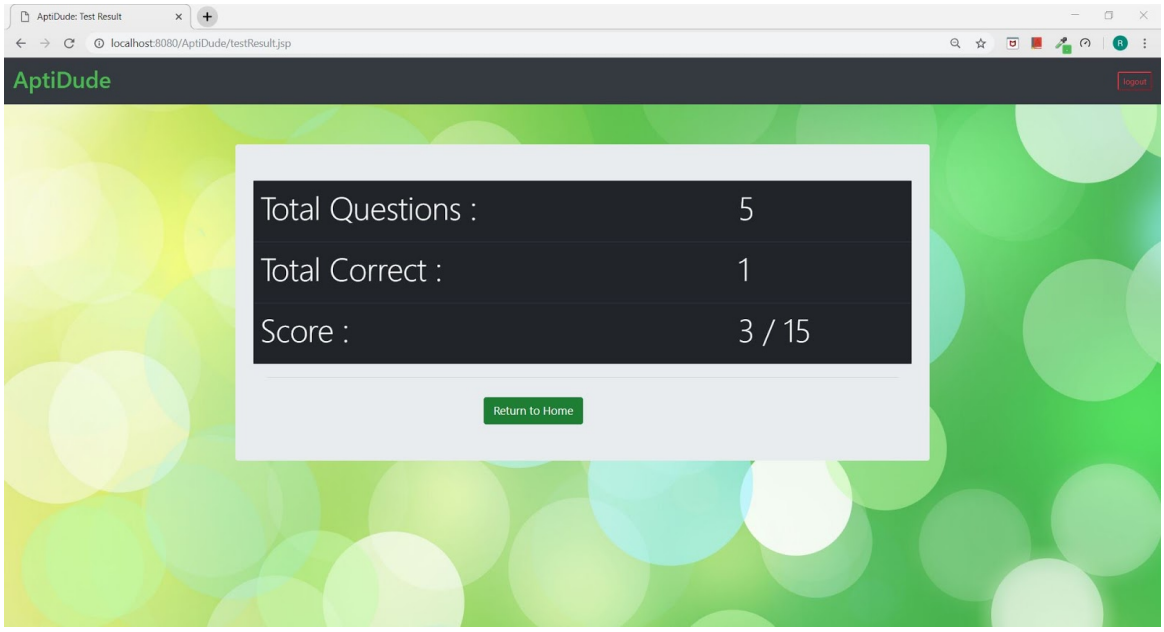

Fig 5.9 Result Screen

CHAPTER-6

CONCLUSION AND FUTURE SCOPE

6.1 Conclusion

From last many years, testing of aptitude has become very necessary to analyse a person's abilities of how quick he/she can solve a problem with concepts they are familiar with. In recent years, the companies have started their hiring on an aptitude test conducted online. What we have made, as an application named AptiDude, is purely a product to test our skills on the areas which were taken up by us as our Summer Training to fulfil the needs of partial completion of our degree. The things presented in this project mainly display a basic concepts of Advanced Java using Servlets and User Interface using HTML, CSS and Bootstrap.

However, this application aims to streamline the concepts, questions and various topics on which the aptitude testing is done on a candidate appearing for one. This application also helps the practice of people who are appearing for government based exams like SSC, Civil Services, Banking Exams, Campus Recruitment exams, etc.

The project is successfully implemented and completed.

6.2 Future Scope

The project has been completed successfully but it still has a lot of scope for improvement. The current functionalities can be improved upon and there is a scope for adding new functionalities in the web application. Both Admin & End-Users can be provided with a more functional and interactive UI as well as fast server side tasks, resulting in overall performance improvement of the web application.

The web application also has a scope to be extended for aspirants other than those pursuing engineering campus placements.

There is scope for compatibility and usability in compact mobile devices.

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