A PRELIMINARY REPORT ON

"PI - CLOUD: Smart Personal Cloud for Corporates and Educational Institutes"

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CERTIFICATE

This is to certify that the project report entitles

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ABSTRACT

Dev server is a kind of server that is intended to extract the advancement and testing of projects, sites, applications for programming developers. It gives a constant domain and all programming utilities that are expected in troubleshooting the code. Development server with raspberry-pi is the hub of a product improvement condition, where programming engineers can precisely test the code. It is involved with the required tools, programming and different parts that are used to send and test any product on which we are working, while testing is finished, the application is moved either to an organizing server or the generation server. In a facilitated programming condition, an improvement server refers to a server level that is assigned to a particular stage in a discharge procedure. Some different instances of levels are Local, Integration, Test/Quality Assurance(QA), UAT, Pre-creation, and Production.

Keywords: *Dev server , Raspberry-Pi, Embedded System*

Contents

List of Abbreviations

QA	Quality Assurance
SRS	Software Requirement Specification
IDE	Integrated Development Environment
API	Application Program Interface
UAT	User Acceptance Testing
OS	Operating System
DFD	Data Flow Diagram
SoC	System on a Chip

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Chapter 1

Introduction

A build server likewise called a Continuous Integration server, is a concentrated, steady and dependable condition for structure distributed improvement projects. The build server begins with a fresh start, so no unapproved setups or ancient rarities are available[1]. Since the code is pulled from the store, just dedicated code will finish up in the discharge variant.

This builds consistency by implementing source control and making it conceivable to hail issues and inform engineers rapidly if there are clashes or missing conditions. It guarantees that a similar unique connection library is utilized for all forms and that out-of-match up registration don't prompt disappointment amid QA testing.

A build server might be arranged to emulate the earth of an end client. This is especially useful with vast or complex activities that may have a long-form time.Along these lines, it can feature the territories where singular developers local arrangements are influencing the code to act diversely on their equipment than it would underway.

1.1 Motivation

The use of various build servers in start-up companies become very expensive as the investment for star-ups that not to high, so in-order to overcome the various disadvantages of the build server pi-cloud is introduced.The main drawbacks of the build server as shown in Figure 1.1 depicts that it only complies a complete code as code editor is not present and line by line execution is not available. The next deprivation of these types of server are that it requires an error free code as debugging is not possible. So Pi-cloud overcomes all these drawbacks related to the build server and compiles all the features like providing code editor, less expensive, part by part code execution and error handling.

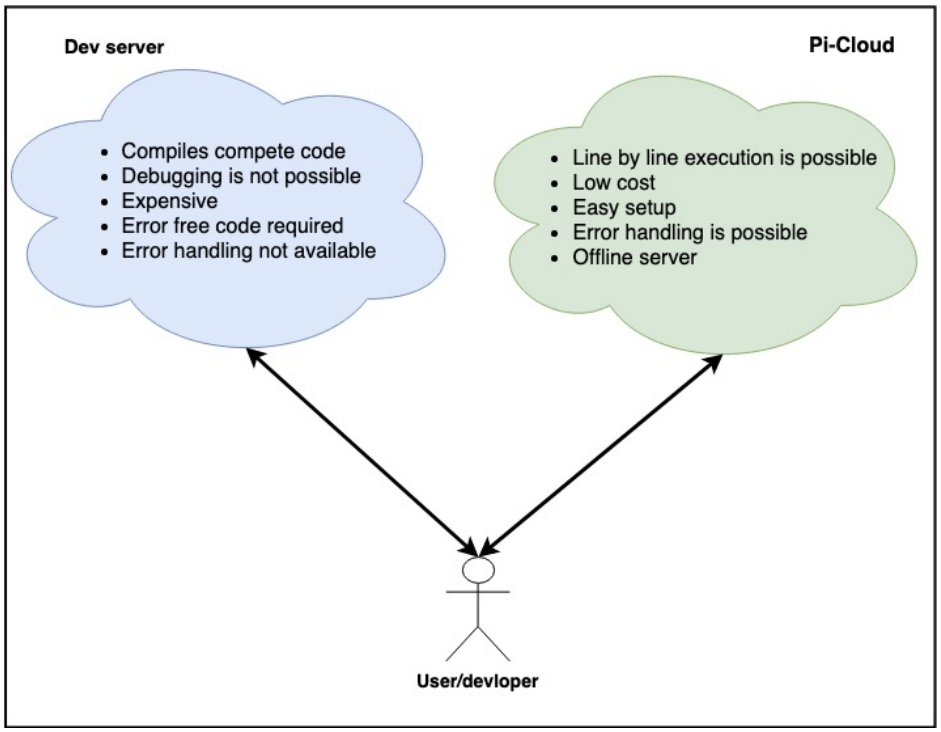

Figure 1.1: User Expectation and Reality of a Dev Server

1.2 Problem Statement

To improve the programming environment for client and environment free platform for compiling code.

1.3 Objectives

1. To provide with environment independent programming.
2. To improve the storage problems faced by users.
3. To make a more secure cloud for data storage by using data encryption techniques.
4. To provide an offline accessibility of cloud.
5. To facilitate the users with data privacy by providing them with password authentications.

1.4 Project Scope

Project scope is the component of project planning involving the determination and documentation of a list of particular project objectives, outcomes, duties, expenses, and deadlines. The project scope documentation called a scope statement, terms of reference or statement of job, describes project limits, set duties for each team member.The scope statement also offers instructions for the project manager to make choices on demands for change during the project. Please note that the scope statement of a project should not be confused with its charter; the charter of a project merely records that

the project exists.

The project scope are as follows:

- Pi cloud provides an offline mode to write and compile code even when there is no internet availability.
- It is very cost effective as compared to other cloud and development-server, as it has very low maintenance cost.
- For any product or system user privacy is a must as the data stored in that system should not be used by anyone, so pi-cloud facilitates its user with user id and password authentications.
- The techniques used for data security is the encryption technique for password which will be carried out at the server-end.

This chapter talks about the introductory part of a build server and gives a clear idea of its uses and also shows the various disadvantages of the server which gave this project a major motivation to overcome the existing system. Henceforth we arrive with a meaningful problem statement and the objective through which we can achieve it.

Chapter 2

Literature Survey

Literature survey may also be known as a literature review. This segment the existing and established theory and research in your report range. You are giving a context for your work. A review or narrative review of literature is a sort of review article. A review of literature is a scholarly paper that involves present understanding including substantive results, as well as theoretical and methodological contributions to a specific subject. Reviews of literature are secondary sources and do not report experimental research new or original. This area can be used to indicate where you are filling an apparent hole in the current hypothesis or learning, or you are proposing something that conflicts with or is questionable to existing ideas.

2.1 Literature Survey

Andy Shui-Yu et.al. proposed the detailed idea of the methods for implementing NFS protocol for larger block/network packets transfer over to NAS Network Attached Storage from Highly Available clients. NAS storage scalability is habitually inadequate to the volume of the appliance. Addition of

an appliance is easy[1].

Yuan et.al. proposed the development of the network technology, the data storage of campus network increases rapidly, and the network storage system that has centrality and efficiency will replace the traditional direct attached storage (DAS) to become the major part of the campus NSS[2].

S Emima and Nigel et.al. proposed the very essential paper for this project as it is very important to understand about the private cloud server.A private cloud server can be set up in a Raspberry Pi which could be used as a storage device for applications involving real time signals. Raspberry Pi is a cheaper microprocessor in which cloud computing infrastructure can be obtained using cloud platforms provided by specific cloud vendors[3].

Yazhong et.al. proposed a comparative analysis of DAS, NAS and a cumulative description of what has brought about data grade sharing between heterogeneous platform, and supports Windows NT, UNIX, L1NUX operation system, particularly suitable for FTP files sharing[4].

Anson Man-Sing et.al. proposed about NAS and the various features it has, which solves the problem of storage. The Network Attached Storage embraces the fascinating features of the Cross-platform, Web Hosting, File Sharing, Cloud Service, Email, Security Control and Multimedia technologies. Currently, NAS is classified as two types, Storage NAS and Platform NAS[5].

Manggiardi BW and Shidik et.al. proposed the usage and existence of this domain. Cloud Computing is the use of virtual machines for efficiency and resource utilization. The study utilizes a virtual machine on cloud computing technology for video rendering needs and is integrated with Network

Attached Storage storage methods, a centralized storage method that uses network media to connect storage media with users[6].

Diao and Qinghong et. al. proposed the features of cloud computing. Along with the growing popularization of Cloud Computing, Cloud storage technology has been paid more and more attention as an emerging network storage technology which is extended and developed by cloud computing concepts[7].

C. D. C. and C. B. S. C. Naelga et.al. proposed the usage of NAS with the wireless storage. The Network-attached Wireless Local Storage is a type of a Network-attached Storage (NAS). It is a data storage, which is connected to a local computer network. It acts as a file-server in a network, offering data storage to be located in a stand-alone unit, which client computers and mobile devices can be connected[8].

2.2 Analysis of Literature Survey

The analysis of all the eight paper that was essential for this project is shown in Table 2.1.The table gives a clear view about all the papers including their methodologies and the benefits and disadvantages of the paper.This analysis helped in analyzing the correct problem and finding the best suitable problem through this project.

Table 2.1: Literature Survey Analysis

Paper. no	Methodology	Pros	Cons
[1]	Web protocol for file transferring on different platforms	Addition of appliance is easy	Large in dimension
[2]	Problems related to existing storage in college data center. Connection of NAS at college and universities data center.	Central data storage.	Hard to maintain and manage.
[3]	Cloud storage on Raspberry pi using different digital and analog sensors.	Raspberry pi is a cheap microprocessor	It has USB 2.0
[4]	NAS and DAS connected using LAN by TCP/IP protocol.	Direct storage	Data transfer speed is less.
[5]	Implementation of e-shopping web application on NAS	Cross-platform, web-hosting	Online
[6]	Rendering of video from NAS for efficient video quality.	Enables media share	Slow rendering speed
[7]	Security of data on cloud storage by using different encryption algorithms.	High in security	Complexity of algorithm
[8]	NAS implementation using raspberry pi, hard disk and router. Raspberry pi connected to wireless router to access it form all devices.	Easy data storage	Costly

2.3 Gap Analysis

A gap analysis is a technique of evaluating the performance gaps between the information systems or software applications of a company to determine whether company demands are being met and, if not, what measures should be taken to guarantee that they are effectively met.

The papers that are addressed above gives a clear view of the gap analysis and by studying those paper it is analyzed that their are dev server available but the performance and portability factors does not exists.The are multiple compilers with platform independent feature but non of the compilers can perform tasks offline.The cost of the present build servers are too high.All these factors draws the attention to work on for this project and bring in the changes for the same.

This chapter Consists of the study of various paper which helped in the deep study about the domain and the topic which is used for this project. The study of various paper and knowing about its disadvantages helps in forming a good problem statement.

Chapter 3

Software Requirements Specification

Software Requirements Specification (SRS) sets the foundation for an agreement between clients and vendors on how the software product should work in a market-driven project and how growth divisions can play these roles.This project has various functional and non-functional requirements which are mentioned below.

3.1 Functional Requirement

- Interface Requirement:
  - Raspberry pi with installed Ubuntu Server operating system.
  - Apache for web socket and file manipulation.
  - Web server setup using domain and FTP server.
  - Localhost and IP configured to unused port from the system.

- Business Requirement:
  - Web portal should be able to display all the data that user uploads or writes.
  - User should be able to perform all the basic operations.
  - Encryption of password without password retrieval.

3.2 Non-Functional Requirements

Performance Requirement:

- Speed of server should be $<$ 50Mbps which helps in smooth functionality of system.
- Web socket 5 with FTP server or Apache server with configured reserved port and domain name or static IP address.
- Security Requirements:
  - Strong password created by user.
  - Confidentiality, Integrity of user's data should be maintained.
  - Identification and authorization of the user's account.
- Software Quality Attributes:
  - Software functional quality reflects how well it complies with or conforms to a given design, based on functional requirements or specifications.
  - That attribute can also be described as the fitness for purpose of a piece of software or how it compares to competitors in the marketplace as a worthwhile product.

– Software structural quality refers to how it meets non-functional requirements that support the delivery of the functional requirements, such as robustness or maintainability, the degree to which the software was produced correctly.

3.3 External Hardware Interface

This section consists of all the information about the hardware that are used in the building of this projects like Raspberry Pi and also describes the various system requirements and the required specifications to build this project.

3.3.1 Raspberry Pi

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom. The Broadcom BCM2835 SoC used in the first generation Raspberry Pi includes a 700 MHz ARM1176JZF-S processor, Video Core IV graphics processing unit (GPU), and RAM. The Ethernet adapter is internally connected to an additional USB port. In Model A, A+, and the Pi Zero, the USB port is connected directly to the System on a Chip (SoC).The SoC is stacked underneath the RAM chip, so only its edge is visible. The 1176JZ(F)-S is the same CPU used in the original iPhone, although at a higher clock rate, and mated with a much faster GPU.

Figure 3.1: Raspberry Pi Board

The Figure 3.1 is a raspberry pi board with the configurations like the earlier V1.1 model of the Raspberry Pi 2 used a Broadcom BCM2836 SoC with a 900 MHz 32-bit quad-core ARM Cortex-A7 processor, with 256 KB shared L2 cache. The Raspberry Pi 2 V1.2 was upgraded to a Broadcom BCM2837 SoC with a 1.2 GHz 64-bit quad-core ARM Cortex-A53 processor, the same SoC which is used on the Raspberry Pi 3, but underclocked (by default) to the same 900 MHz CPU clock speed as the V1.1. The BCM2836 SoC is no longer in production. The Raspberry Pi 3+ uses a Broadcom BCM2837B0 SoC with a 1.4 GHz 64-bit quad-core ARM Cortex-A53 processor, with 512 KB shared L2 cache.

3.3.2 Storage Media(HDD/SSD)

A hard disk drive (HDD), hard disk, hard drive, or fixed disk, is an electromechanical data storage device that uses magnetic storage to store and retrieve digital information using one or more rigid rapidly rotating disks (platters) coated with magnetic material. The platters are paired with mag-

netic heads, usually arranged on a moving actuator arm, which read and write data to the platter surfaces. Data is accessed in a random-access manner, meaning that individual blocks of data can be stored or retrieved in any order and not only sequentially. HDDs are a type of non-volatile storage, retaining stored data even when powered off.

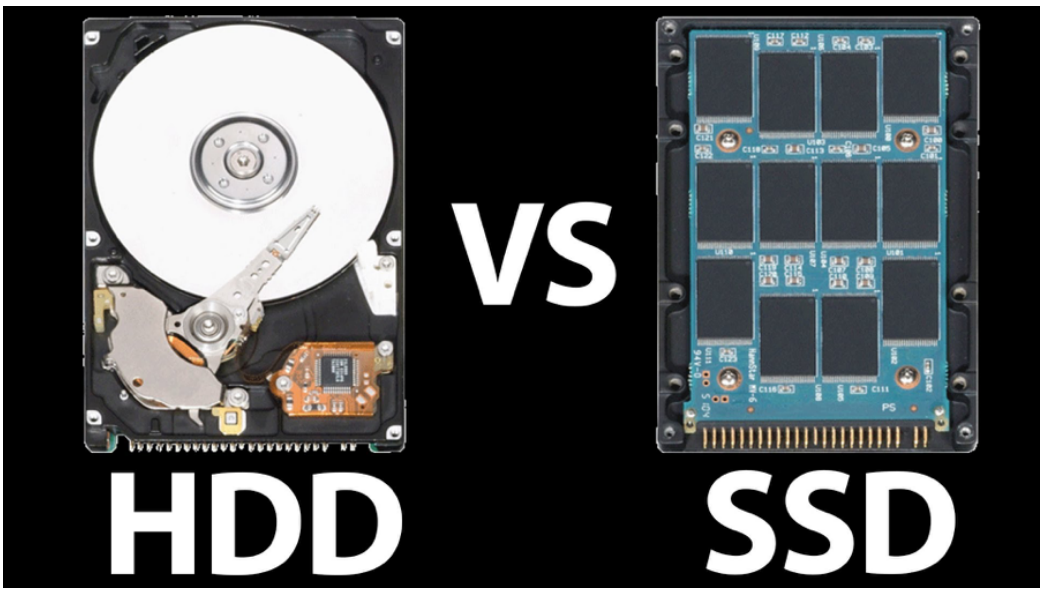

Figure 3.2: HDD vs SSD

HDDs became the dominant secondary storage device for general-purpose computers by the early 1960s. Continuously improved, HDDs have maintained this position into the modern era of servers and personal computers. Solid-state drives (SSDs) have higher data-transfer rates, higher areal storage density, better reliability, and much lower latency and access times. Figure 3.2 represents the difference between HDD and SSD and the revenues for SSDs, most of which use NAND, slightly exceed those for HDDs. Though SSDs have nearly 10 times higher cost per bit, they are replacing HDDs where speed, power consumption, small size, and durability are important.

3.3.3 WIFI Interface(for raspberry Pi version lower than 3B+)

A USB Wi-Fi adapter or dongle plugs into one of your desktop or laptop's universal serial bus (USB) ports, allowing you to connect to a wireless network in the home, office, or a public place. You can use this connection to access shared files, devices, and documents, or to connect to the Internet.

3.4 System Requirement

Table 3.1: System Requirements for Windows

Windows	**Mini Requirement**	**Recommended**
Internet connection	LAN or WIFI	WIFI
Operating system	Windows 7/8/10	Windows 8
Computer processor	CPU with NIC	1.5 GHz processor
Memory	1GB or more	2GB
Server	FTP	FTP, HTPC

The system requirement for the windows system is shown in Table 3.1. The table gives the minimum requirement for a system which is required at the time of execution and also guides on the recommended requirement with the use of which the system will work more efficiently.

Table 3.2: System Requirements for MacOS

MacOS	**Mini Requirement**	**Recommended**
Internet connection	LAN or WIFI	WIFI
Operating system	Mac OSX	Mac OS High Sierra
Computer processor	CPU with NIC	i5 3rd Gen
Memory	1GB or more	2GB
Server	FTP	FTP, SMD, HTPC

The system requirement for the MacOS is shown in Table 3.2. The table gives the minimum requirement for a system which is required at the time of execution and also guides on the recommended requirement with the use of which the system will work more efficiently.

Table 3.3: System Requirements for Linux

Linux	**Mini Requirement**	**Recommended**
Internet connection	LAN or WIFI	WIFI
Operating system	Ubuntu, Fedora or any Linux	Ubuntu, Fedora
Computer processor	CPU with NIC	1.5GHz Multicore
Memory	1GB or more	2GB
Server	FTP	FTP, HTPC

The system requirement for the Linux system is shown in Table 3.3. The table gives the minimum requirement for a system and also guides on the recommended requirements.

This chapter consists of the SRS which helps in the marketing of the product developed and gives all the functional as well as non-functional requirement of this project.it also describes the hardware requirements of this project with its proper specification and also gives the system requirements with minimum and recommended requirements.

Chapter 4

System Design

Systems design implies a systematic approach to the design of a system. It may take a bottom-up or top-down approach. But either way the process is systematic wherein it takes into account all related variables of the system that needs to be created—from the architecture. To the required hardware and software, right down to the data and how it travels and transforms throughout its travel through the system. Systems design then overlaps with systems analysis, systems engineering and systems architecture.

The system architecture is divided into two parts as client and server as shown in Figure 4.1 the server is setup using a raspberry pi and apache server. Whereas the client side needs to only have a web browser to open the web page using the domain. The server is pre-configured and has installed compilers, for example, C, C++, Java, Python, Python3 on it. When the client opens the webpage based which is developed using PHP language and HTML, CSS for page feature enhancement, it shows editor and a drop-down menu for selecting the preferred language of the user.

4.1 System Architecture

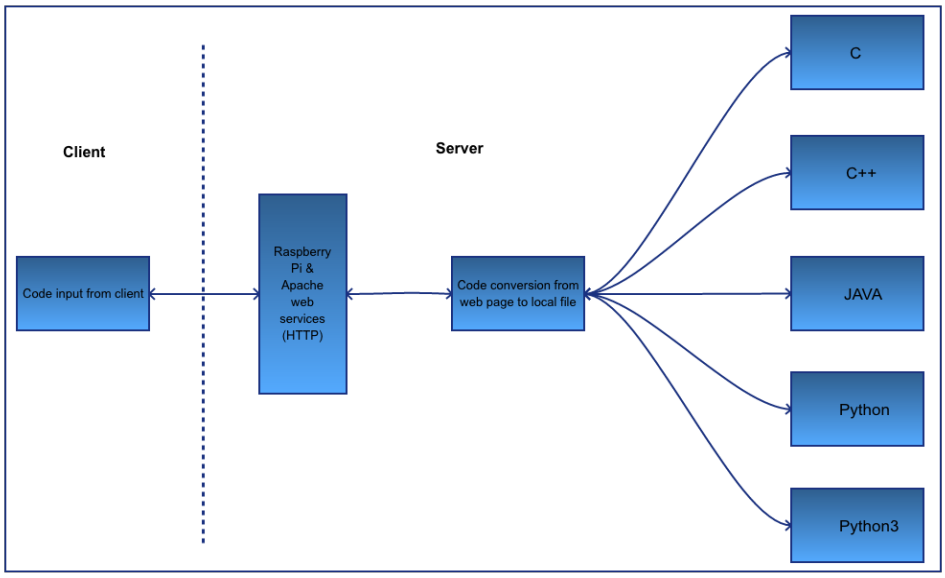

Figure 4.1: Block Diagram of Pi Cloud

Once the user inputs the code in the selected language at as shown in Figure 4.1 the user passes the input and submits the code to the server. The submission of the code is done using POST method for forms. Next, the server writes the code in the main file and input in an input.txt file and then it checks for the selected compiler from the user. After that, the server passes the main file and input.txt file to the compiler using shell command. The compiler compiles and interprets the code and gives the output of the code in an output file. If their exits any error in the code it writes the code in error.log file and server sends that log to the client side. Then the errors are shown on the user screen. If there is no error then the output file is passed to the client side and the output is shown on the client page.

4.2 Mathematical Model

Let **S** be the solution set of the problem of the project.

S={S, E, I, O, DD, NDD, Fs, Success, Failure}

Where,

S= {Start state}

E= {End state}

I= {Set of inputs to the system}

{I1:C code, I2:C++ code, I3:JAVA code, I4:Python code, I5:Python3 code}

O= {Set of outputs}

{O1:Code output, O2:Syntax error, O3:Logical error, O4:Connection error}

DD= {Deterministic data}

{Code, Input}

NDD= {Non-Deterministic data}

{Power consumed by system}

Fs= {Function used by system}

F1: Login authentication

F2: Language selection

F3: Code compilation

Success= {Execution and output of code with respect to input}

Failure= {Connection failure due to busy or unavailable ports leading to bad login}

4.3 Data Flow Diagram

Data flow diagrams are used to graphically represent the flow of data in a business information system. DFD describes the processes that are involved in a system to transfer data from the input to the file storage and reports generation.

4.3.1 Data Flow Diagram Level 1

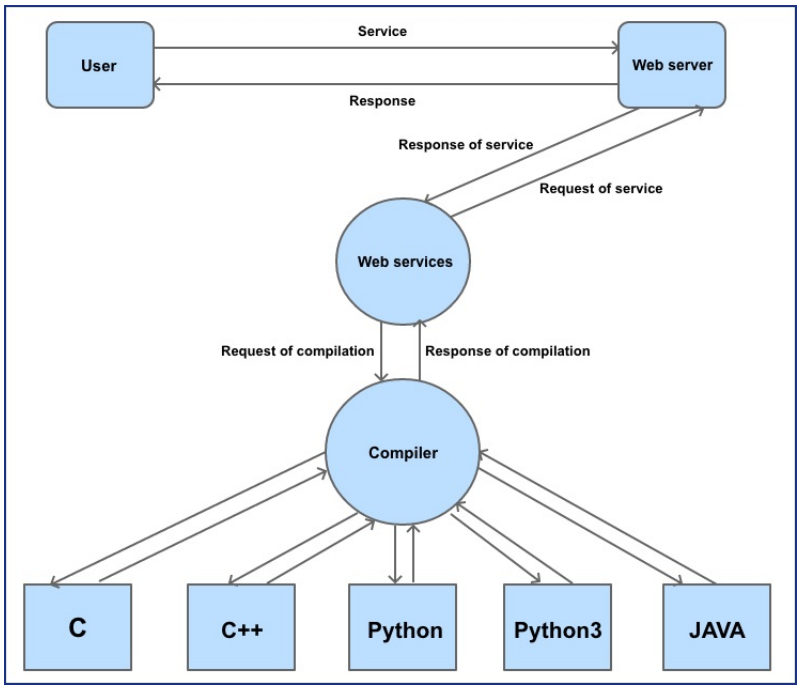

Figure 4.2: Data Flow Diagram of Pi Cloud

Data Flow diagram for level 1 is shown in Figure 4.2 where rectangular shape denotes the activity of the User, Web Server and the Compiler selector. The circular shape are the process between the the activity performer and the compilers.

4.3.2 Data Flow Diagram Level 2

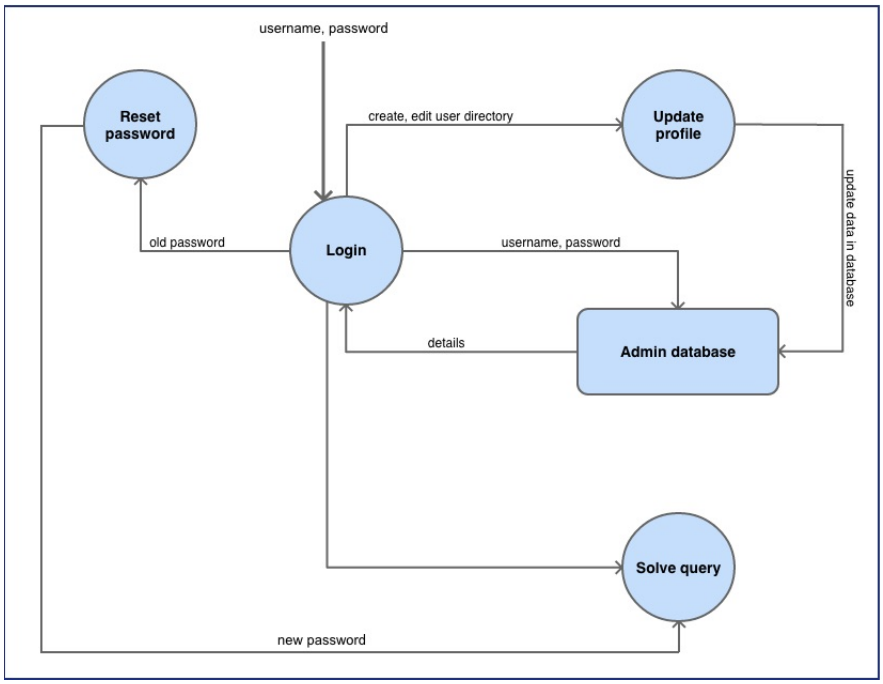

Figure 4.3: Data Flow Diagram of Pi Cloud

DFD for level 12 is shown in Figure 4.3 shows the flow of Pi Cloud i.e the server authentication process. The flow helps in understanding the authentication process by manually updating/modifying the database.

4.4 UML Diagram

The Unified Modeling Language (UML) is to forge a common, semantically and syntactically rich visual modeling language for the architecture, design, and implementation of complex software systems both structurally and behaviorally. UML has applications beyond software development, such as process flow in manufacturing.

4.4.1 Use Case Diagram

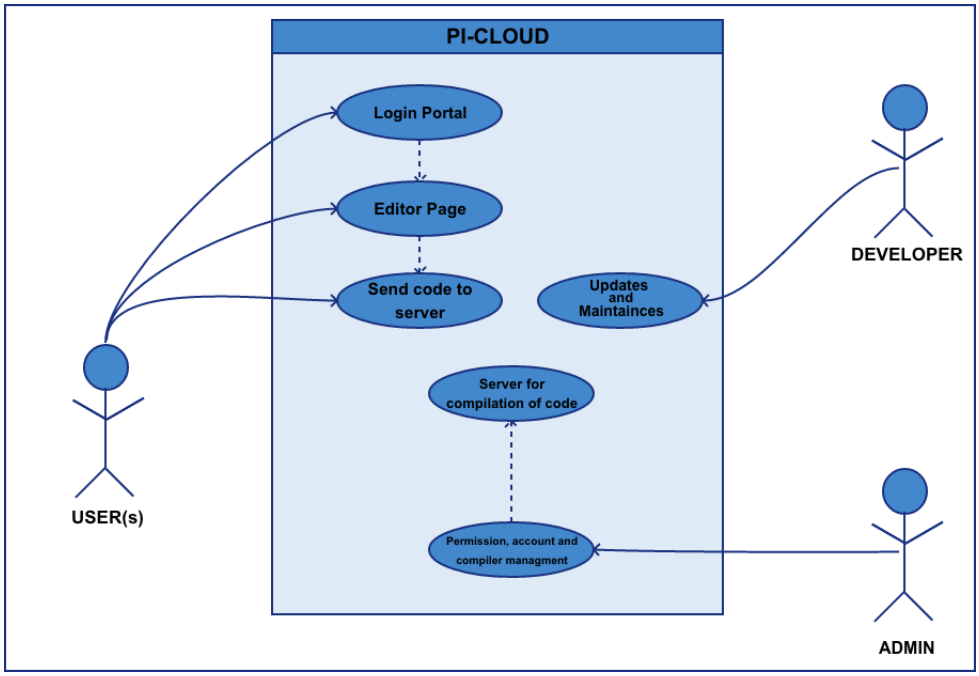

Figure 4.4: Use Case Diagram for Pi Cloud

Use Case Diagram is represented in the Figure 4.4 and it depicts the important role of User, Developer and the system Admin on Pi-Cloud. The User can access the Login portal to login into the system by username and password authentication. After logging into the system user can use the editor page to write, compile, execute and troubleshoot the code errors. Once the user sends the code to the server the server side will compile and execute the code by sending the response tot he system. The Developer and Admin are server side roles who are responsible to manage the database by performing activities like create, delete, modify and update the records from the database. The system Admin also manually creates and deletes the user account on the Apache directory where the temporary files of compiler are created.

4.4.2 Class Diagram

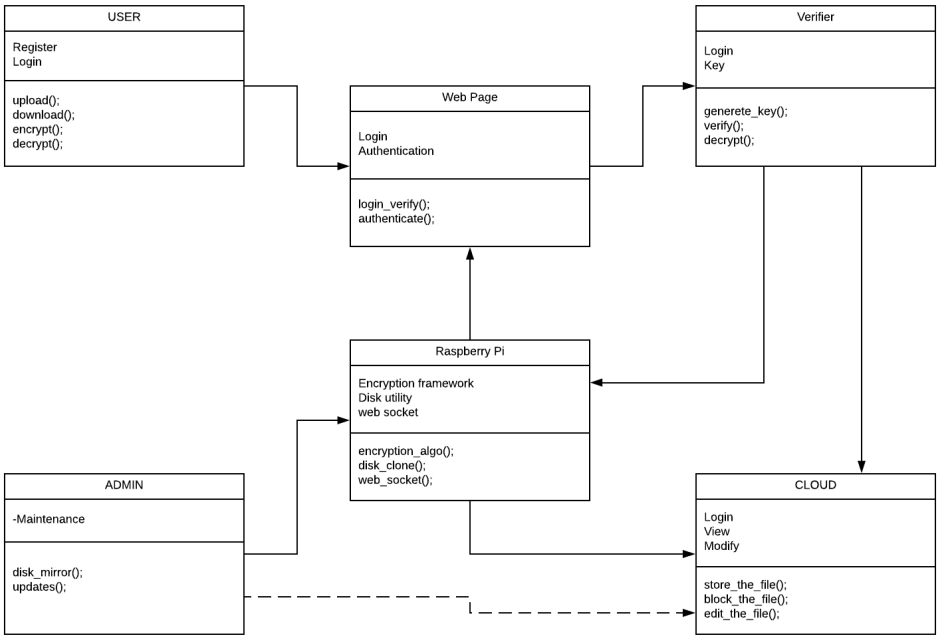

Figure 4.5: Class Diagram of Pi Cloud

Pi Cloud is majorly divided into six classes which are parent classes used to maintain the integration of the system for client-server architecture. The Classes as shown in Figure 4.5 is used are classified based on the role of the person on that system i.e the User, Verifier, Web Page, Admin, Cloud.

4.4.3 Activity Diagram

Activity Diagrams described in Figure 4.6 shows how activities are coordinated to provide a service which can be at different levels of abstraction. Typically, an event needs to be achieved by some operations, particularly where the operation is intended to achieve a number of different things that require coordination, or how the events in a single use case relate to one

another, in particular, use cases where activities may overlap and require coordination.

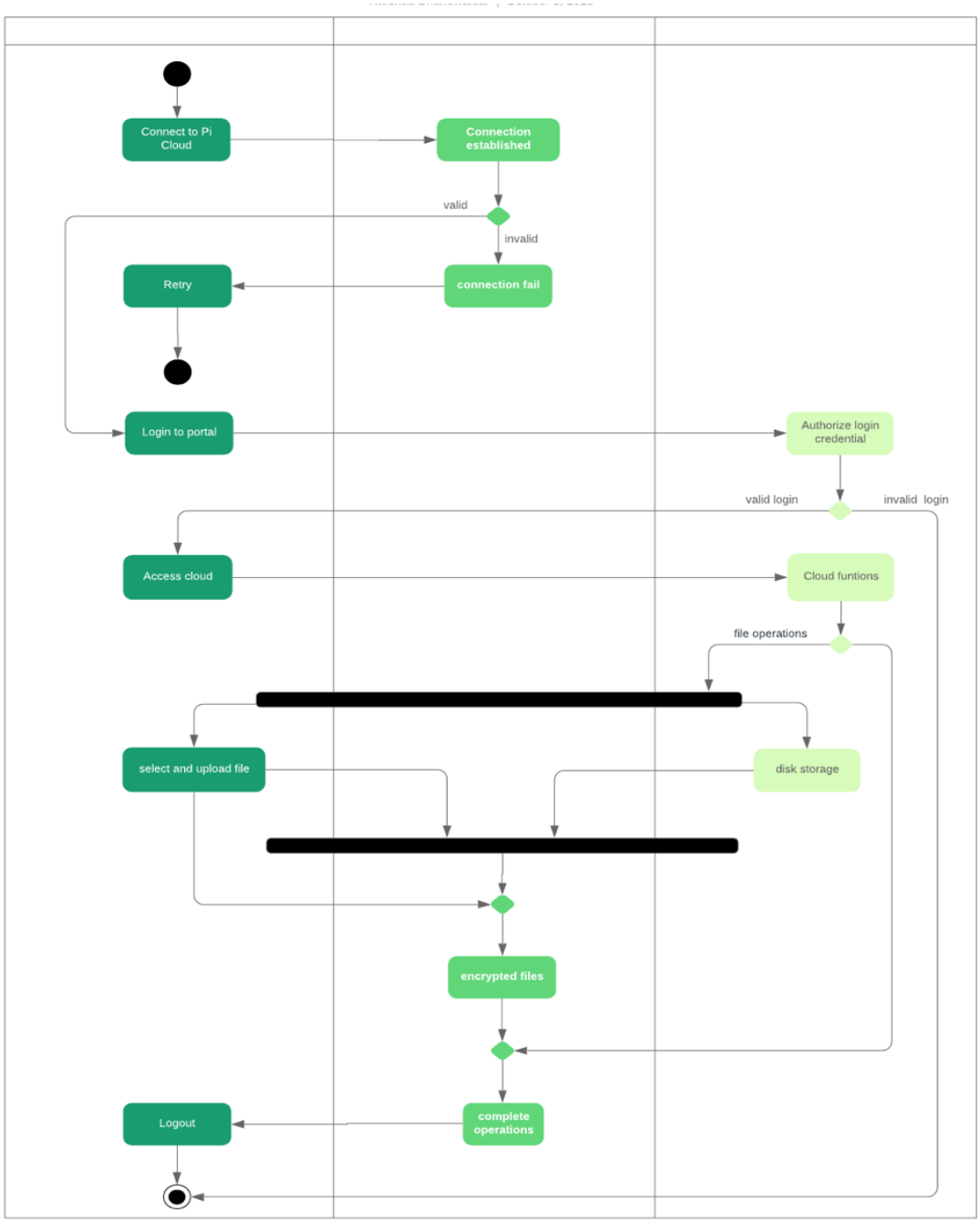

Figure 4.6: Activity of Pi Cloud

Chapter 5

Project Plan

The aim of project planning is to predict as many hazards and issues as possible; and to plan, organize and regulate operations so that, despite all hazards, the project is finished on time and as effectively as possible.

5.1 Project Environment

Project Environment of Pi-Cloud is compatible with Apache server as it is a client-server architecture that has specific hardware environment for the deployment of the project.

Table 5.1: Project Environment

Software Environment	Editor Apache Server
Hardware environment	i3 Processor, 2 GB RAM, 500 MB free HDD space
Programming languages	Php, http, css.
External API	MySQL

The Table 5.1 gives the minimum hardware environment requirements that is i3 Processor, 2 GB RAM etc.

5.1.1 Project Resources

1. Human Resources
   (a) Developers
2. Reusable Software Resources
   (a) Platform: PHP
   (b) Technology : PHP 5 and Above
   (c) Database : MySQL
   (d) Server: Apache 2.4 server.

5.2 Risk Management

Risk management is the method by which threats to an organization are identified, assessed and controlled.The element of risk management is shown in Figure 5.1 which project has under gone.

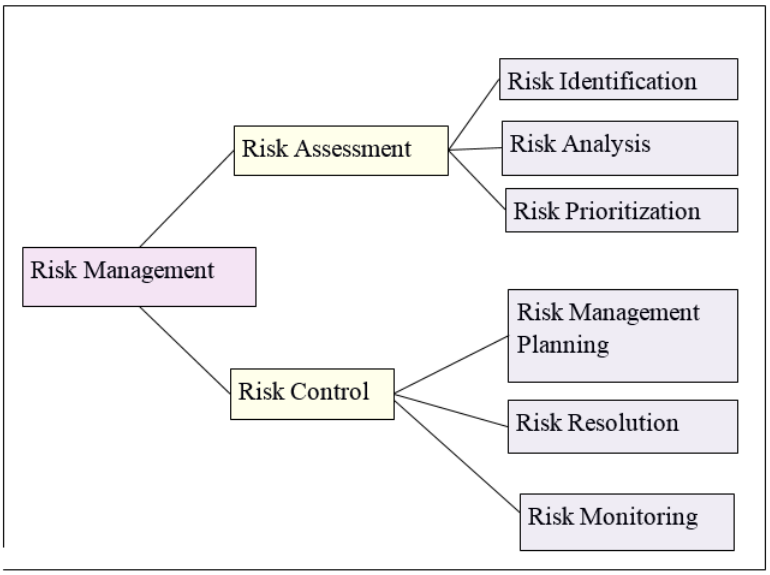

Figure 5.1: Elements of Risk Management

Major Risks

Major risks that visualize for this software development are:

Impact Levels: The risks are categorized on the basis of their probability of occurrence and the Table 5.2 depicts the impact that is rated and impact they would have if they occur.

Table 5.2: Risk Impact Level

1	Catastrophic
2	Critical
3	Marginal
4	Negligible

Performance Risk

The Table 5.3 gives the probability and impact of all the possible risk that can happen during the project development and also after the project is deployed.

Table 5.3: Performance Risk

Sr. No	**Risk**	**Likelihood**	Impact
1	Will the system process 100-150 systems	Low	Critical
2	Will the system able to handle multiple users at a time?	Low	Critical
3	Will the system handle multiple errors?	Low	Critical
4	Will the system degrade the performance of other subsystems	Low	Critical
5	Will the software have defects after release?	Low	Catastrophic

Project Risks

Project risk is an uncertain condition that affects at least one goal of the project if it happens and risks related to the project is mention, in the Table 5.4, so it is important to focus on identifying and evaluating project hazards and handling those risks in order to minimize project effect.

Table 5.4: Project Risks

Sr. No	**Risk**	**Probability**	Impact
1	Will the project overshoot predefined deadlines?	Low	Critical
2	Will the customer requirement remain constant throughout the development of the project?	Low	Critical

Risk management tools is used to create project management efficient. Measures referring to the same project danger and achieving its goals should be assumed. The project risk management (PRM) scheme should be based on the skills of staff ready to use them to accomplish the objective of the project.

5.3 Project Schedule

Project planning includes communicating with tasks and needs to be accomplished. Organizational resources will be assigned in which time frame to complete the task. A schedule for a project is a document that collects all the work required to deliver the project on time.

5.3.1 Project task set

Major Tasks in the Project stages are shown in the Figure 5.2 which shows the task description according to the tasks happened serially.

Task No.	Task Description
Task 1	a) Search for the most relevant and recent project and research topic
	b) Finalization of the project topic
	c) Identification of the problem with the present topic that is selected
Task 2	a) Reading of the numerous research papers related to our project
	b) Finalization of the base paper and supporting papers
	c) Formation of the Problem Statement
Task 3	a) Designing of tour system
	b) Analyzation of the design
Task 4	c) Coding according to the design
	d) Dividing the code in various modules
Task 5	a) Perform alpha testing
	b) Perform Integration testing
	c) Perform system testing
	d) Perform beta testing
	e) Deployment

Figure 5.2: Task Sets

5.3.2 Task Network

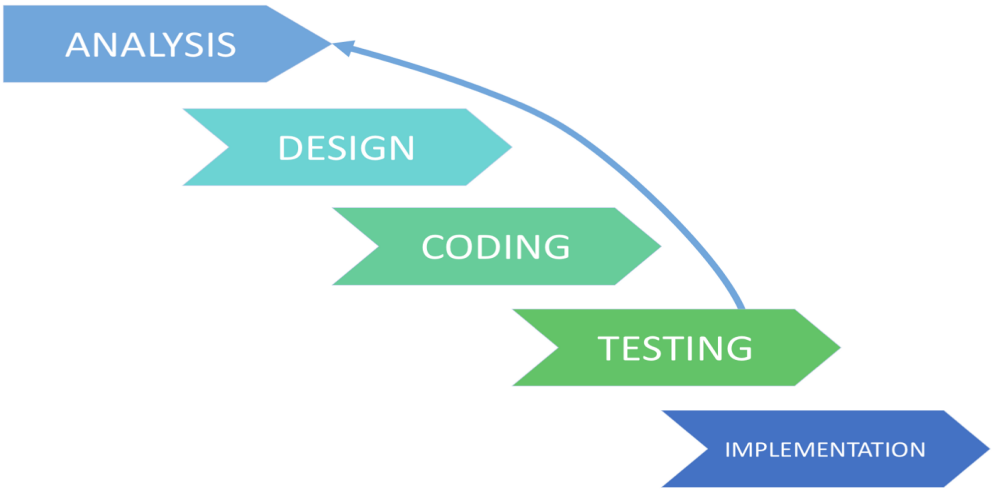

Figure 5.3: Task Network

A graphic representation of how the tasks are flowing in a software engineering project is depicted in Figure 5.3 . There is a pattern and a sequence that is followed by tasks. This task network can be used as a mechanism or a way to know this sequence and pattern of the tasks that can act as an input to an automated project scheduling tool.

5.3.3 Timeline Chart

A timeline is a type of chart which visually shows a series of events in chronological order over a linear timescale. The power of a timeline is that it is graphical, which makes it easy to understand critical milestones, such as the progress of a project schedule as shown in Figure 5.4.
Timelines are particularly powerful for project scheduling or project management when paired with a gantt chart.

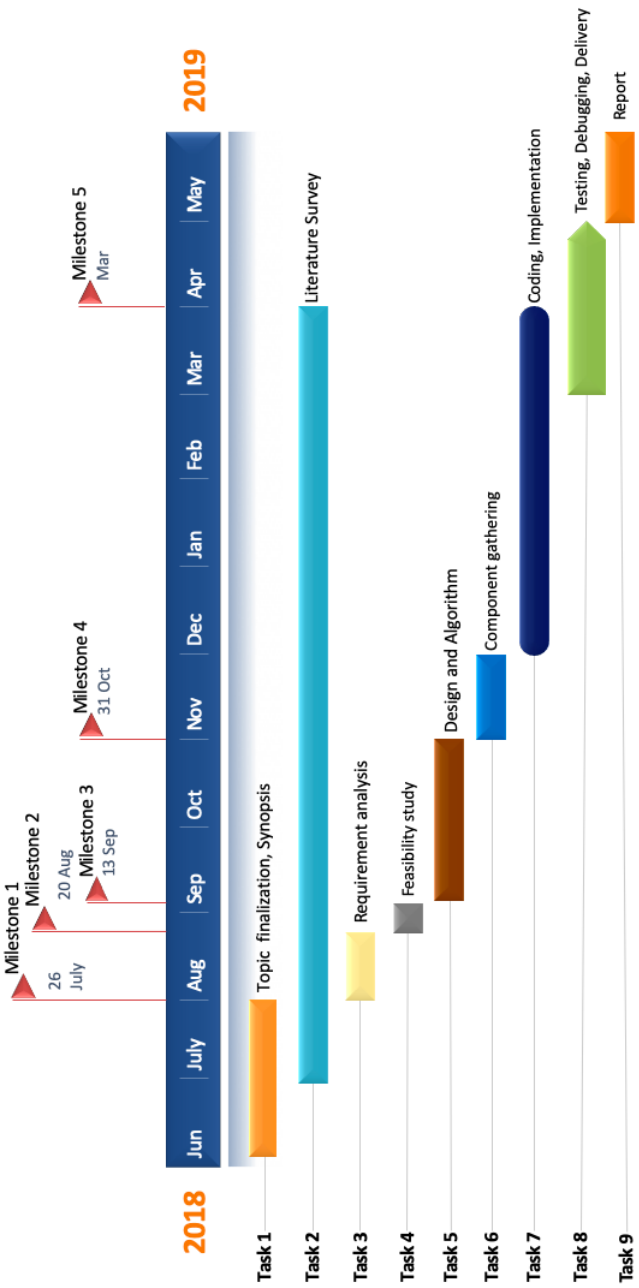

Figure 5.4: Timeline Chart

5.4 Team Organization

A Project Team is an organized group of individuals engaged in carrying out the project's shared activities and goals to accomplish the project and produce its outcomes.

5.4.1 Team Structure

The project is accomplished by a group of two members under the guidance of the internal guide.All the members of the group are aware of all the details about the project. The project was divided into various modules and the modules were equally divided and completed by the group members. It would be impossible to achieve all the results without team work. It was easy to complete all the modules and documentation with the help of each member contributing to it equally and abiding the comments and suggestions given by the internal guide.

5.4.2 Management Reporting and Communication

We have regular reported to our internal guide. We have also maintained a project diary where all the dates with the date wise implementation details are mentioned and is regularly check by our internal guide and the panel members. This chapter deals with the various project risks that may occur during the project or even after the deployment is done.It also describes the project schedule and the timeline chart which helped in accomplishing the deadline provided for the project.

Chapter 6

Implementation

Implementation is a method that takes place at noticeable phases and prevalent elements are effectively implemented.Methods of active execution include best practices linked to the implementation and execution stages.

6.1 Overview of Project Modules

- Client module contents the user side and the user machine.
- Server module contents the Apache server, compiler and the database.
  - Apache Server: It is used as the network framework.
  - Compilers: Server are installed with all the compilers.
  - Database: User credentials are stored in database.

6.2 Tools and Technologies Used

Tools and Technologies used in developing this system are as classified below in Software and Hardware.

6.2.1 Software Used

In this project we will be using PHP as frontend and MySQL as backend programming language.
Software interface will be developed on following specifications:

- Operating System: Ubuntu
- Programming Language: PHP
- Tools: Apache, Notepad, MySQL, gcc, python, python3, JAVA,
- Software version: PHP5, MySQL7.0

6.2.2 Hardware Specification

- Processing Unit: Intel Core i3 processor or any higher versions
- RAM: Minimum 1 GB
- Storage Device: Minimum 100GB
- Connectivity: Fast ethernet or WiFi Connection

6.3 Algorithm

Step 1 → Start
Step 2 → Connect to server using domain name or IP address
Step 3 → Login to portal using login credential: username and password

```
1 $_SESSION["username"] = $username;
2 $header("Location: ./$username/");
```

Step 4 → select preferred language for writing code

```
switch($languageID) {
        case "c":
      {
        include("../compilers/c.php");
        break;
      }
      case "cpp":
      {
        include("../compilers/cpp.php");
        break;
      }
      case "java":
      {
          include("../compilers/java.php");
        break;
      }
      case "python2.7":
      {
          include("../compilers/python27.php");
        break;
      }
      case "python3.2":
      {
          include("../compilers/python32.php");
        break;
      }
    }
```

Step 5 → Write the code and give the input values needed at runtime. If

input values are NULL then go to step 7

```
<form action="compile.php" method="post" enctype="multipart/form-data" id="form2">
```

Step 6 → Give input values according to the datatype declared in code and proceed

Step 7 → Submit code to server for compilation using submit button; POST method for submitting code

Step 8 → Output is displayed in output section of the page

Step 9 → End

6.4 Programming language

Different programming languages are used based on client server architecture. This are further classified into Frontend languages and Backend languages as follows:

6.4.1 Frontend: PHP

What is PHP?

- PHP is an acronym for "PHP: Hypertext Preprocessor"
- PHP is a widely-used, open source scripting language
- PHP scripts are executed on the server
- PHP is free to download and use

What is a PHP File?

- PHP files can contain text, HTML, CSS, JavaScript, and PHP code
- PHP code are executed on the server, and the result is returned to the browser as plain HTML
- PHP files have extension ".php"

What Can PHP Do?

- PHP can generate dynamic page content
- PHP can create, open, read, write, delete, and close files on the server
- PHP can collect form data
- PHP can send and receive cookies
- PHP can add, delete, modify data in your database
- PHP can be used to control user-access
- PHP can encrypt data

With PHP you are not limited to output HTML. You can output images, PDF files, and even Flash movies. You can also output any text, such as XHTML and XML.

Why PHP?

- PHP runs on various platforms (Windows, Linux, Unix, Mac OS X, etc.)
- PHP is compatible with almost all servers used today (Apache, IIS, etc.)

- PHP supports a wide range of databases
- PHP is free. Download it from the official PHP resource: www.php.net
- PHP is easy to learn and runs efficiently on the server side

6.4.2 Backend: MySQL

What is MySQL?

- MySQL is a database system used on the web
- MySQL is a database system that runs on a server
- MySQL is ideal for both small and large applications
- MySQL is very fast, reliable, and easy to use
- MySQL uses standard SQL
- MySQL compiles on a number of platforms
- MySQL is free to download and use
- MySQL is developed, distributed, and supported by Oracle Corporation
- MySQL is named after co-founder Monty Widenius's daughter: My

The data in a MySQL database are stored in tables. A table is a collection of related data, and it consists of columns and rows.

The main part of the project that is the implementation part is discussed in this chapter.All the tools and the specifications of both the hardware and software used are described in this chapter.

Chapter 7

Software Testing

Testing is the process of evaluating a system or its component(s) with the intent to find whether it satisfies the specified requirements or not. Testing is executing a system in order to identify any gaps, errors, or missing requirements in contrary to the actual requirements.

7.1 Types of Testing

Different types of testing that are performed on the system are:

1. Unit Testing
2. Integration testing
3. System Testing

7.1.1 Unit Testing

Unit testing, also known as Module Testing, focuses verification efforts on the module. The module is tested separately and this is carried out at the programming stage itself. Unit Test comprises of the set of tests performed by

an individual programmer before integration of the unit into the system. Unit test focuses on the smallest unit of software design- the software component or module. Using component level design, important control paths are tested to uncover errors with in the boundary of the module.

7.1.2 Integration Testing

It is a systematic technique for constructing the program structure while at the same time conducting tests to uncover errors associated with in the interface. It takes the unit tested modules and builds a program structure. All the modules are combined and tested as a whole. Integration of all the components to form the entire system and an overall testing is executed.

7.1.3 System Testing

Tests to find the discrepancies between the system and its original objective, current specifications and system documentation. The system software is tested as a whole. It verifies all elements mesh properly to make sure that all system functions and performance are achieved in the target environment.

The focus areas are:

- System functions and performance.
- System reliability and recoverability (recovery test).
- System behavior in the special conditions (stress and load test).
- System user operations (acceptance test/alpha test).
- Hardware and software integration collaboration.

- Integration of external software and the system

7.2 Test cases and Test result

A test case is an input specification, execution conditions, testing procedure, and anticipated outcomes that define a single test to be performed to accomplish a specific software testing goal, such as exercising a specific program route or verifying compliance with a specific requirement. Test instances are subject to testing that is methodical rather than hazardous.

A test case describes an input, action, or event and an expected response, to determine if a feature of a software application is working correctly. A test case may contain particulars such as test case identifier, test case name, objective, test conditions/setup, input data requirements, steps, and expected results.

In the simplest form, a test case is a set of conditions or variables under which a tester determines whether the software satisfies requirements and functions properly. A test case is a single executable test which a tester carries out.

It guides them through the steps of the test. You can think of a test case as a set of step-by-step instructions to verify something behaves as it is required to behave.

7.2.1 Unit Testing

Module 1: Login

The Table 7.1 shows the login module and all its possible test scenarios.

TEST CASE ID	TEST SCENARIO	TEST CASE	PRE CONDITION	TEST STEPS	TEST DATA	EXPECTED RESULT	POST CONDITION	ACTUAL RESULT	STATUS
TC_M1_01	Verify the login of user portal	Enter valid username and valid password	Need a valid portal on server	1.Enter username 2.Enter password 3.Click login button	<valid user name> <valid password>	Successful login	Code editor is shown & session begins	Bad login	Fail
TC_M1_02	Verify the login of user portal	Enter valid username and valid password	Need a valid portal on server	1.Enter username 2.Enter password 3.Click login button	<valid user name> <valid password>	Successful login	Code editor is shown & session begins	Successful login	Pass
TC_M1_03	Password is stored in encrypted format	Password is stored in encrypted format	Strong password created by user	1.Create a strong password	-	Secured login	-	Secured login	Pass

Table 7.1: Login Module Test Case

Module 2: Compiler and Editor

The Table 7.2 shows the compiler and editor testing and all its possible test scenarios related to it.

TEST CASE ID	TEST SCENARIO	TEST CASE	PRE CONDITION	TEST STEPS	TEST DATA	EXPECTED RESULT	POST CONDITION	ACTUAL RESULT	STATUS
TC_M2_01	Write & Check C compiler	Write a sample code of C	Need a valid C code	1.Write code in editor 2.Submit the code	<sample code> <sample input>	Output for the C code is generated	Code output is shown in output box	Successful output of sample code	Pass
TC_M2_02	Write & Check C++ compiler	Write a sample code of C++	Need a valid C++ code	1.Write code in editor 2.Submit the code	<sample code> <sample input>	Output for the C++ code is generated	Code output is shown in output box	Successful output of sample code	Pass
TC_M2_03	Write & Check Java compiler	Write a sample code of Java	Need a valid Java code	1.Write code in editor 2.Submit the code	<sample code> <sample input>	Output for the Java code is not generated	Code output is shown in output box	Error for main class	Fail
TC_M2_04	Write & Check Python compiler	Write a sample code of Python	Need a valid Python code	1.Write code in editor 2.Submit the code	<sample code> <sample input>	Output for the Python code is generated	Code output is shown in output box	Successful output of sample code	Pass
TC_M2_05	Write & Check python 3 compiler	Write a sample code of Python 3	Need a valid Python 3 code	1.Write code in editor 2.Submit the code	<sample code> <sample input>	Output for the Python 3 code is generated	Code output is shown in output box	Successful output of sample code	Pass
TC_M2_06	Write & Check Java compiler	Write a sample code of Java	Need a valid Java code	1.Write code in editor 2.Submit the code	<sample code> <sample input>	Output for the Java code is generated	Code output is shown in output box	Successful output of sample code	Pass

Table 7.2: Compiler and Editor testing

Module 3: Logout

The Table 7.3 shows the logout page module and all its possible test scenarios.

TEST CASE ID	TEST SCENARIO	TEST CASE	PRE CONDITION	TEST STEPS	TEST DATA	EXPECTED RESULT	POST CONDITION	ACTUAL RESULT	STATUS
TC_M3_01	Logout and end session	Verify the logout action	Valid link for logout button	1.click on the logout button	-	Logout the user and end the session	Redirect to Login page	Successfully logged out	Pass

Table 7.3: Logout Page Testing

Module 4: Server Testing

The Table 7.4 shows the server and all its possible test scenarios.

TEST CASE ID	TEST SCENARIO	TEST CASE	PRE CONDITION	TEST STEPS	TEST DATA	EXPECTED RESULT	POST CONDITION	ACTUAL RESULT	STATUS
TC_M4_01	Connect with apache server	Connection established using apache server	Valid IP address with root directory access	1.Restart apache 2.Connect with Port 8080	-	Connection established successfully	Display index.php using IP address	Connection established successfully	Pass
TC_M4_02	Get data on server using POST method	Get plain text data from client to server using POST method	Valid code from client to server	1.Write code at client side 2.Submit code using POST method	<sample code> <submit button code>	Code received at server side	Get output from server	Code received at server end	Pass

Table 7.4: Server Testing

This chapter consists of all the possible test cases which are essential to carry out this project.All the possible test cases that was done during and after the project are addressed in this chapter.

Chapter 8

Results

Results are the changes or effects expected to take place after implementing the project. The results are generally positive improvements to the lives of the beneficiaries.

8.1 Outcomes

- High power compiler server with error handling.
- Low voltage requirement because of Raspberry Pi.
- Offline work mode in the server campus via Ethernet or WiFi.
- Multiple language support e.g C, C++, Java, Python, Python32.
- Traffic load distribution over the network by Apache framework.

8.2 Screenshots

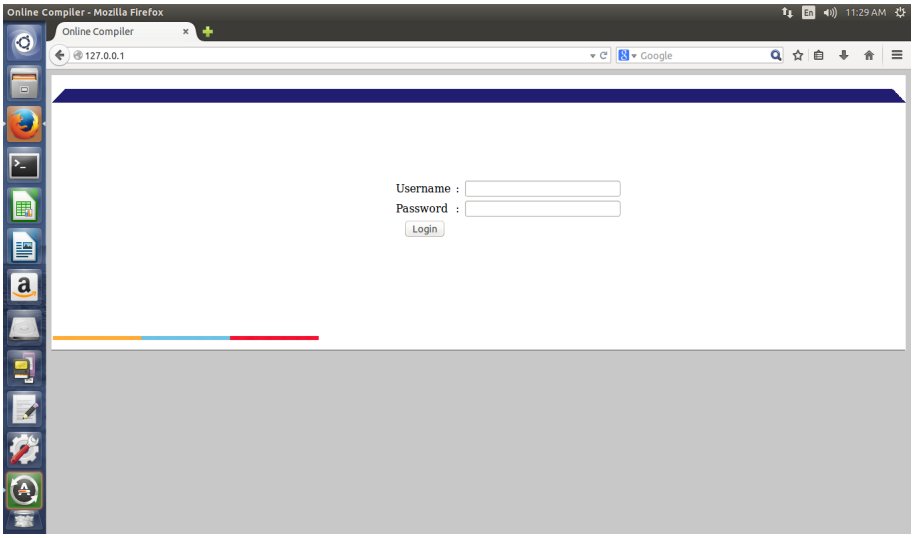

Figure 8.1: Screenshot 1- Login Page for User

The Figure 8.1 shows the login page for the user which can be accessed by the IP address or the domain name from the Apache server.

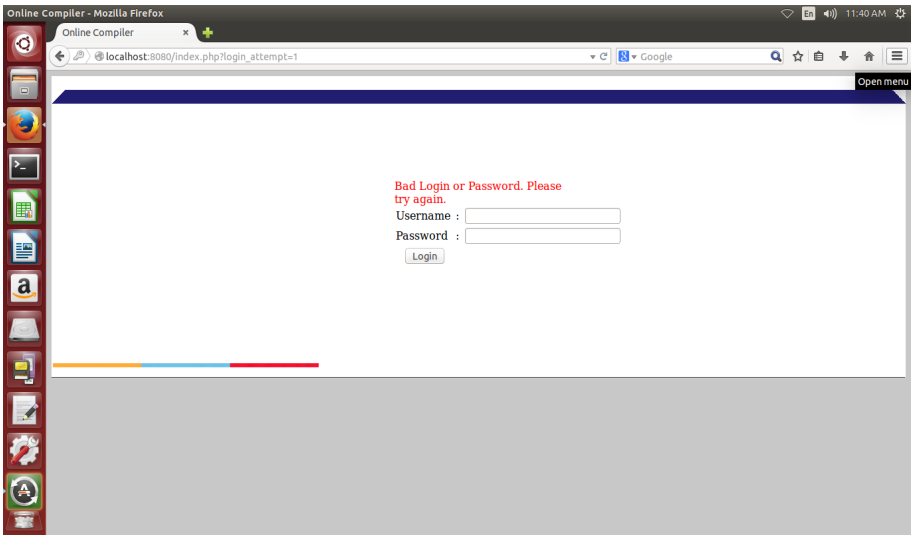

Figure 8.2: Screenshot 2- Validation of Login Page

The Figure 8.2 show the validtaion of the bad login by the user at the

Login Page of the System.

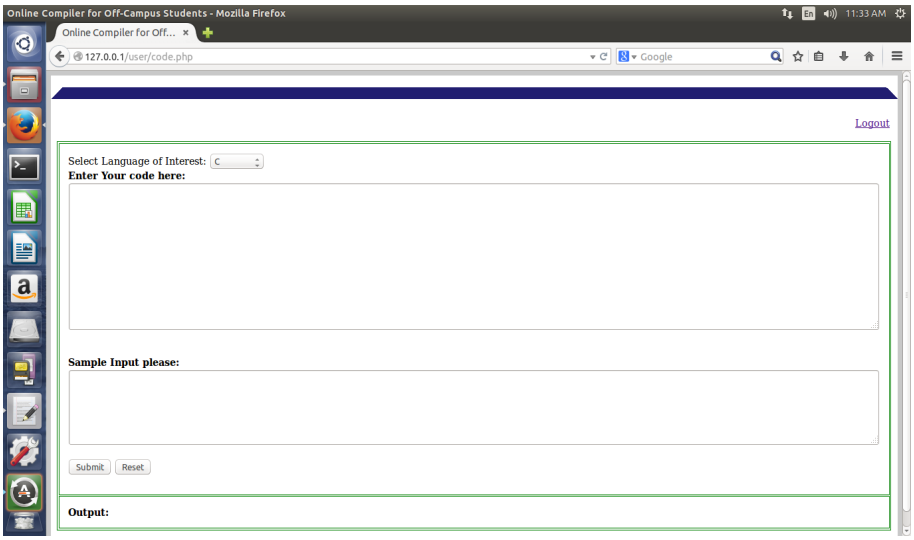

Figure 8.3: Screenshot 3- Editor Page of System

After successfully logging in the system, user will get a editor page as shown in Figure 8.3. It has different fields where user can write or edit the code and then execute it. After execution user gets output for the code in the Output field of the same page.

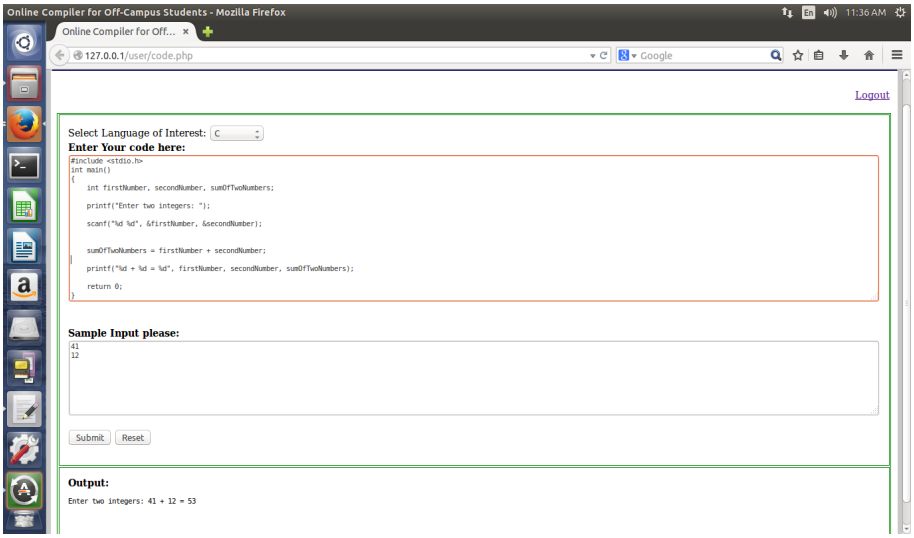

Figure 8.4: Screenshot 4- Different Fields on Editor Page

The Figure 8.4 shows the editor page of the user with a code in the editor filed of the page.

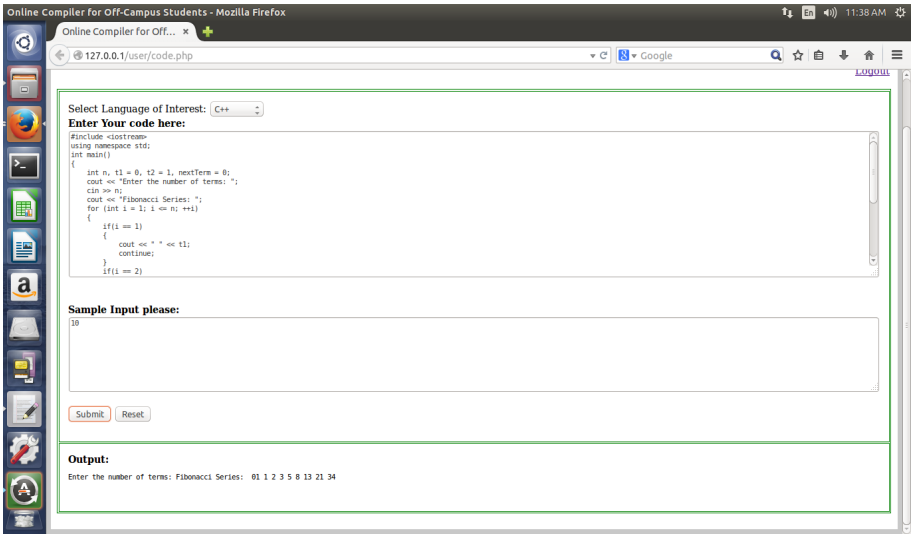

Figure 8.5: Screenshot 5- Compilation of Code

After submitting the code to the server, the server compiles the code and generates output which is then send back to the client machine and displayed on the same page in Output field as shown in Figure 8.5.

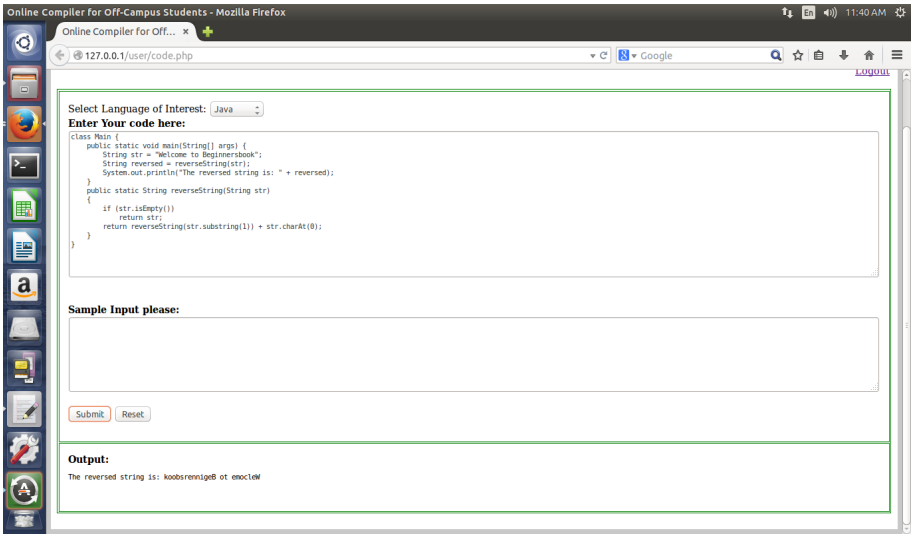

Figure 8.6: Screenshot 6- Selection Preference for Languages

User can select different languages to code from the drop down menu of the Editor page. The selected compiler is updated at server side. As shown in Figure 8.6 JAVA is selected as the compiler

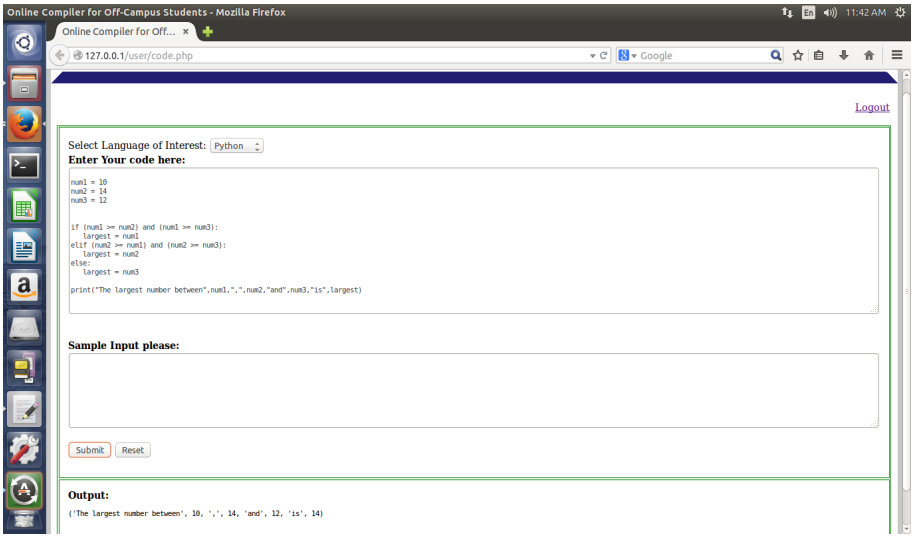

Figure 8.7: Screenshot 7- Deafult Selected Language as Python

In Figure 8.7 user has selected default language of coding as Python which is then updated at server side for compilation.

This chapter deals with the project results and project objectives.The Various types of outputs. It also consists of all the screen shots taken during the project implementation and at the time of testing.

Chapter 9

Conclusion

To overcome the disadvantages of the build servers that are used in various companies are obtained. The Pi-cloud does not only solves the problem of the small-scaled companies but is proved as a very useful system for educational institute. The project contains four base papers and four supporting papers which describes the problems that an online cloud has in present.

All the problems are addressed and various techniques that can be used to solve these problems are labeled. One of the analyzed solution is that localized cloud should be used, which enables many advanced techniques like data encryption, data security which have password authentications and can be offline accessible. These days data storing devices are too costly and not portable, hence is not used commonly by the clients. On the other hand, PI-Cloud is cost effective and can be used anywhere as it is highly portable and can be accessed if attached with a power bank.

9.1 Future Work

- Can be used in MNCs.
- Implement bots to enhance the feature of Pi-cloud.
- Can be reduced to a pocket sized device.
- Data Analytics technique can be used to search for the

9.2 Applications

- In start-up companies for code compilation.
- Educational institutes can host a platform independent compiler for the student

Appendix A

- P versus NP Algorithm :
  - P-Class – consists of those problems that are solvable in polynomial time, i.e. these problems can be solved in time O(nk) in worst-case, where k is constant. These problems are called tractable, while others are called intractable or super polynomial.
  - NP-Class - The class NP consists of those problems that are verifiable in polynomial time. NP is the class of decision problems for which it is easy to check the correctness of a claimed answer, with the aid of a little extra information. Hence, we aren't asking for a way to find a solution, but only to verify that an alleged solution really is correct.
- P versus NP :

  Every decision problem that is solvable by a deterministic polynomial time algorithm is also solvable by a polynomial time non-deterministic algorithm. All problems in P can be solved with polynomial time algorithms, whereas all problems in NP - P are intractable. It is not known whether P = NP. However, many problems are known in NP with the property that if they belong to P, then it can be proved that P = NP.

Appendix B

[1] Damini, Harshad P. Bhandaldar, Geeta S. Navale; "PI - CLOUD: Smart Personal Cloud for Corporates and Educational Institutes"; pp. [2395-1621], IERJournal, 2019.

[2] Damini, Harshad P. Bhandaldar; "Convene", Smt. kashibai Navale College of Engineering, Pune-41, 2019.


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BACHELOR'S DEGREE IN COMPUTER ENGINEERING

***Abstract*—A dev server is a kind of server that is intended to extract the advancement and testing of projects, sites, applications for programming developers. It gives a constant domain and all programming utilities that are expected in troubleshooting the code. Development server with raspberry-pi is the hub of a product improvement condition, where programming engineers can precisely test the code. It is involved with the required tools, programming and different parts that are used to send and test any product on which we are working, while testing is finished, the application is moved either to an organizing server or the generation server. In a facilitated programming condition, an improvement server refers to a server level that is assigned to a particular stage in a discharge procedure. Some different instances of levels are Local, Integration, Test/QA, UAT, Pre-creation, and Production.**

Keywords— dev server , Raspberry-Pi, Embedded

I. Introduction

A build server likewise called a Continuous Integration server(CI- server), is a concentrated, steady and dependable condition for structure distributed improvement projects. The build server begins with a fresh start, so no unapproved setups or ancient rarities are available. Since the code is pulled from the store, just dedicated code will finish up in the discharge variant. This builds consistency by implementing source control and mak- ing it conceivable to hail issues and inform engineers rapidly if there are clashes or missing conditions.It guarantees that a similar unique connection library is utilized for all forms and that out-of-match up registration dont prompt disappointment amid Quality Assurance (QA) testing.A build server might be arranged to emulate the earth of an end client. Along these lines, it can feature the territories where singular developers local arrangements are influencing the code to act diversely on their equipment than it would underway. A build server can likewise speed the advancement procedure by opening up assets on developers nearby machines.This is especially useful with vast or complex activities that may have a long-form time.

II. Motivation

he use of various build servers in start-up companies become very expensive as the investment for star-ups that not to high, so in-order to overcome the various disadvantages of the build server pi-cloud is introduced. The main drawbacks of the build server are that it only complies a complete code as code editor is not present and line by line execution is not available. The next deprivation of these types of server are that it requires anerror free code as debugging is not possible. So Pi-cloud overcomes all these drawbacks related to the build server and compiles all the features like providing code editor, less expensive, part by part code execution and error handling.

III. Objective

- To provide with environment independent programming.

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- To improve the storage problems faced by users.
- To make a more secure cloud for data storage by using data encryption techniques.
- To provide an offline accessibility of cloud.
- To facilitate the users with data privacy by providing them with password authentications.

IV. Literature Survey

"K. J. L. Kumar, "Implementing network file system protocol for highly available clustered applications on network attached storage," ***Proc. - 5th Int. Conf. Comput. Intell. Commun:***
Method for implementing NFS protocol for larger block/network packets transfer over to NAS Network Attached Storage from Highly Available clients. NAS storage scalability is habitually inadequate to the volume of the appliance. Addition of an appliance is easy.

F. Yuan and M. Educational, "The Construction of the Network Storage System in the Data Centers of Colleges and Universities" pp. [208–211], 2011.", The development of the network technology, the data storage of campus network increases rapidly, and the network storage system that has centrality and efficiency will replace the traditional direct attached storage (DAS) to become the major part of the campus NSS.

•**"S. E. Princy and K. G. J. Nigel, "Implementation of cloud server for real time data storage using Raspberry Pi,"** ***2015 Online Int. Conf. Green Eng. Technol.*****, pp. [1–4], 2015.",** A private cloud server can be set up in a Raspberry Pi which could be used as a storage device for applications involving real time signals. Raspberry Pi is a cheaper microprocessor in which cloud computing infrastructure can be obtained using cloud platforms provided by specific cloud vendors.

"R. Yazhong, "Data Storage in Digital Library using Multi-Storage Technology" pp. [558–561], 2011.",Compared with DAS, NAS has brought about data grade sharing between heterogeneous platform, and supports Windows NT, UNIX, L1NUX operation system, particularly suitable for FTP files sharing.

" A. M.-S. M. Andy Shui-Yu Lai, "Designing network attached storage architecture for small and medium enterprise applications," *Lect. Notes Electr. Eng.*, vol. 474, pp. [274–279], 2018.**-",** The Network Attached Storage embraces the fascinating features of the Cross-platform Web Hosting, File Sharing, Cloud Service, Email, Security Control and Multimedia technologies. Currently, NAS is classified as two types, Storage NAS and Platform NAS.

M. B. W. Tirta and G. F. Shidik, "c," ***Proc. - 2017 Int. Semin. Appl. Technol. Inf. Commun. Empower. Technol. a Better Hum. Life, iSemantic 2017*****, vol. 2018–Janua, pp. [157–163], 2018 :**Cloud Computing is the use of virtual machines for efficiency and resource utilization. The study utilizes a virtual machine on cloud computing technology for video rendering needs and is integrated with Network Attached Storage storage methods, a centralized storage method that uses network media to connect storage media with users.

D. **Zhe, W. Qinghong, S. Naizheng, and Z. Yuhan, "Study on Data Security Policy Based on Cloud Storage,"** ***2017 IEEE 3rd Int. Conf. Big Data Secur. Cloud (BigDataSecurity), IEEE Int. Conf. High Perform.*** **pp. [145–149], 2017:** Along with the growing popularization of Cloud Computing. Cloud storage technology has been paid more and more attention as an emerging network storage technology which is extended and developed by cloud computing concepts.

C. D. C. and C. B. S. C. Naelga, T. G. Jun Valenzona, M. R. Gualiza, I. C. Ajon, J. V. Antifuesto, A. Nangcas, B. "NETWORK-ATTACHED WIRELESS LOCAL STORAGE," vol. CXVI, no. 89, pp. [1865–1869], 2015:
Network-attached Wireless Local Storage is a type of a Network-attached Storage (NAS). It is a data storage, which is connected to a local computer

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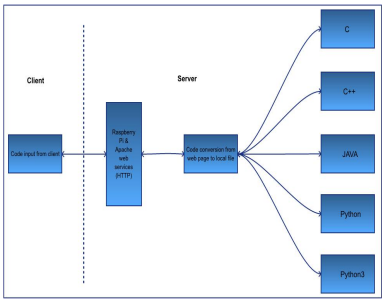
network. It acts as a file-server in a network, offering data storage to be located in a stand-alone unit, which client computers and mobile devices can be connected

V. SYSTEM ARCHITECTURE



WORKING

The system architecture is divided into two parts as client and server, the server is setup using raspberry pi and apache server. Whereas the client side needs to only have a web browser to open the web page using domain.The server is pre-configured and has installed compilers for example, C, C++, Java, Python, Python3 on it. When client opens the webpage based which is developed using PHP language and HTML, CSS for page feature enhancement, it shows editor and drop-down menu for selecting preferable language of the user. Once the user input the code in selected language, user passes the input and submits the code to the server. The submission of the code is done using POST method for forms. Next the server writes the code in main file and input in input.txt file and then it checks for the selected compiler from the user. After that the server passes the main file and input.txt file to the compiler using shell command. The compiler compiles and interprets the code and gives the output of the code in output file. If their exits any error in the code it writes the code in error.log file and server sends that log to client side. Then the errors are shown on the user screen. If there is no error then the output file is passed to client side and the output is shown on the client page.

VI. MATHEMATICAL MODEL

Let **S** be the solution set of the problem of the project.

S={S, E, I, O, DD, NDD,
Fs, Success, Failure}
Where,
S= {Start state}
E= {End state}
I= {Set of inputs to the system}
{I1:C code, I2:C++ code, I3:JAVA code, I4:Python code, I5:Python3 code}

{I1:C code, I2:C++ code, I3:JAVA code, I4:Python code,I5:Python3 code}

{O1:Code output, O2:Syntax error, O3:Logical error, O4:Connection error}

DD= {Deterministic data}{Code, Input}
NDD= {Non-Deterministic data}
{Power consumed by system}

Fs= {Function used by system}

F1: Login authentication

F2: Language selection F3:

Code compilation

Success= {Execution and output of code with respect to input} Failure= {Connection failure due to busy or

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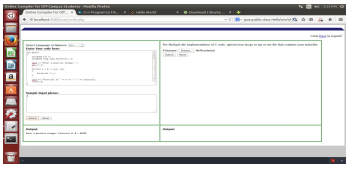
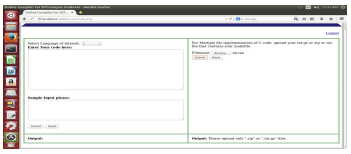
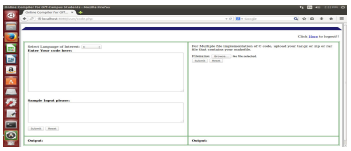
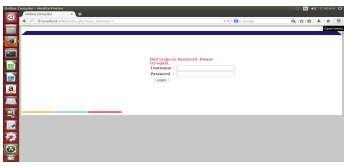
unavailable ports leading to bad login}

RESULTS









VI. ADVANTAGES

1)Offline
2)Error handling is possible
3)Line by line execution can be done
4)Low cost
5)Easy setup and maintenance
6)Codes can be compiled in small chunks

VII CONCLUSION

To overcome the disadvantages of the build servers that are used in various companies are obtained. The Pi-cloud does not only solves the problem of the small-scaled companies but is proved as a very useful system for educational institute. The project contains four base papers and four supporting papers which describes the problems that an online cloud has in present. All the problems are addressed and various techniques that can be used to solve these problems are labeled. One of the analyzed solution is that localized cloud should be used, which enables many advanced techniques like data encryption, data security which have password authentications and can be offline acces- sible. These days data storing devices are too costly and not portable, hence is not used commonly by the clients. On the other hand, PI-Cloud is cost effective and can be used anywhere as it is highly portable and can be accessed if attached with a power bank.

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Appendix C

SmallSEOTools

PLAGIARISM SCAN REPORT

Words	956	Date	June 04,2019
Characters	5771	Exclude Url	

5%	95%	3	36
Plagiarism	Unique	Plagiarized Sentences	Unique Sentences

Content Checked For Plagiarism

Dev server is a kind of server that is intended to extract the advancement and testing of projects, sites, applications for programming developers. It gives a constant domain and all programming utilities that are expected in troubleshooting the code. Development server with raspberry-pi is the hub of a product improvement condition, where programming engineers can precisely test the code. It is involved with the required tools, programming and different parts that are used to send and test any product on which we are working, while testing is finished, the application is moved either to an organizing server or the generation server. In a facilitated programming condition, an improvement server refers to a server level that is assigned to a particular stage in a discharge procedure. Some different instances of levels are Local, Integration, Test/QA, UAT, Pre-creation, and Production.

A build server likewise called a Continuous Integration server, is a concentrated, steady and dependable condition for structure distributed improvement projects. The build server begins with a fresh start, so no unapproved setups or ancient rarities are available. Since the code is pulled from the store, just dedicated code will finish up in the discharge variant. This builds consistency by implementing source control and making it conceivable to hail issues and inform engineers rapidly if there are clashes or missing conditions. It guarantees that a similar unique connection library is utilized for all forms and that out-of-match up registration don't prompt disappointment amid Quality Assurance (QA) testing.

A build server might be arranged to emulate the earth of an end client.This is especially useful with vast or complex activities that may have a long-form time. Along these lines, it can feature the territories where singular developers local arrangements are influencing the code to act diversely on their equipment than it would underway.

The use of various build servers in start-up companies become very expensive as the investment for star-ups that not to high, so in-order to overcome the various disadvantages of the build server pi-cloud is introduced. The main drawbacks of the build server as shown in figure 1.1 depicts that it only complies a complete code as code editor is not present and line by line execution is not available. The next deprivation of these types of server are that it requires an error free code as debugging is not possible. So Pi-cloud overcomes all these drawbacks related to the build server and compiles all the features like providing code editor, less expensive, part by part code execution and error handling.

Problem Statement

To improve the programming environment for client and environment free platform for compiling code.

Objectives

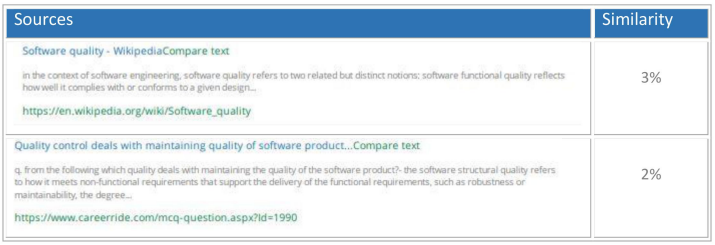
• To provide with environment independent programming.
• To improve the storage problems faced by users.
• To make a more secure cloud for data storage by using data encryption techniques.
• To provide an offline accessibility of cloud.
• To facilitate the users with data privacy by providing them with password authentications.

Project Scope:

Pi cloud provides an offline mode to write and compile code even when there is no internet availability.

It is very cost effective as compared to other cloud and development server, as it has very low maintenance cost. For any product or system user privacy is a must as the data stored in that system should not be used by anyone, so pi-cloud facilitates its user with user id and password authentications. The techniques used for data security is the encryption technique for password which will be carried out at the server-end.
This chapter talks about the introductory part of a build server and gives a clear idea of its uses and also shows the various disadvantages of the server which gave this project a major motivation to overcome the existing system. Henceforth we arrive with a meaningful problem statement and the objective through which we can achieve it.

Specification of software requirements sets the foundation for an agreement between clients and vendors on how the software product should work in a market-driven project and how growth divisions can play these roles. This project has various functional and non-functional requirements which are mentioned below.
Interface Requirement:
Raspberry pi with installed Ubuntu Server operating system.
Apache for web socket and file manipulation.
Web server setup using domain and FTP server.
Localhost and IP configured to unused port from the system.
Performance Requirement:
Speed of server should be < 50Mbps which helps in smooth functionality of system.
Web socket 5 with FTP server or Apache server with configured reserved port and domain name or static IP address.
Security Requirements:
Strong password created by user.
Confidentiality, Integrity of user's data should be maintained.
Identification and authorization of the user's account.
Software Quality Attributes:
Software functional quality reflects how well it complies with or conforms to a given design, based on functional requirements or specifications. That attribute can also be described as the fitness for purpose of a piece of software or how it compares to competitors in the market place as a worthwhile product. Software structural quality refers to how it meets non-functional requirements that support the delivery of the functional requirements, such as robustness or maintainability, the degree to which the software was produced correctly.
This section consists of all the information about the hardware that are used in the building of this projects like Raspberry Pi and also describes the various system requirements and specifications to build this project.



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