

1.3.4: Percentage of students undertaking field projects / research projects / internships

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Contents

1. Link for additional information

BA LLB (Hons)
Faculty of Law
Marwadi University

**1.3.4 Approval from concerned HOD along with Project
Report/Completion certificate**



Faculty of Law

NGO: HAMARI PAHCHAN

INTERNSHIP FINAL REPORT

**INTERNSHIP WEEKLY REPORT SUBMITTED TO
MARWADI UNIVERSITY, FACULTY OF LAW
IN PARTIAL FULFILLMENT OF REQUIREMENTS OF
B.A., LL.B. (Hons.) DEGREE**

**SUBMITTED BY : JAY CHAUHAN
ENROLLMENT NUMBER: 92101040009
FROM : 28th Jan to 28th Feb, 2022**


Dean
Faculty of Law
Marwadi University
Rajkot

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Acknowledgement:

The success and fail outcome of this internship required a lot of guidance and assistance from the supervisor and I am extremely privileged to have got this all along the completion of my internship. All that I have done is only due to such supervisor and assistance of Prof. Bangkim Singh. I am thankful to and fortunate enough to get constant encouragement, support and guidance from him.

Signature of Student: JKC

Date: 7th March, 2022

Place: Marwadi University

TABLE OF STATUTES

1. Right to information Act, 2005
2. Right to education, 2009



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ABBREVIATIONS:

SR NO.	ABBREVIATION	DETAILS
1	HP	Hamari Pahchan
2	NGO	Non-governmental organization
3	RTI	Right to information
4	RTE	Right to education
5	CSR	Corporate Social Responsibility

INTRODUCTION

HP is an NGO which located in Delhi. It is an NGO that gives a platform to deserving people from across the society. The team is filled with to contribute towards the society at large, focusing on making people happier and filling them with chances of success. Main goal of the NGO is to let everyone have a meal before they sleep. In a population of more than 2,00,000 underprivileged people residing in slums around South Delhi with approx. 5-6 members in each family and at least 2 members without a job is an unfortunate situation that is alarming and needs attention, therefore, This NGO distributing free ration kits for each family in south Delhi of underprivileged families and distributed 30,000 Sanitary kits in 2021 and organize awareness campaigns and started a vaccination drive where people from slums were encouraged to get vaccinated for free.

During my Internship, I have been assigned by many tasks related to content writing, research, social media campaigning and provided community service.

INTERSHIP WORKOVERVIEW:

During my Internship, I have been assigned by many tasks related to content writing, research, social media campaigning and provided community service.

Week: 1

In my first week of internship, I have been assigned the task of content writing. My topic was 'Malnutrition'. I was supposed to write content on the given topic. Another task was a social media campaigning.

Week: 2

In my second week of internship, I have been assigned the task of content writing. My topic was 'Right to Quality Education of underprivileged children'.

Week: 3

In my third week of internship, I have been assigned the task of filing RTI. I filed RTI to department of justice on pendency of cases in Fast-track courts in high courts of India. Reason behind the filing this RTI is that on social media no data is available on this topic. Another task was to deliver lecture on "*Caste Reservation*" in India. I covered topics like origin of caste, influence of British raj, Pre independence history, Caste discrimination, Caste reservation in education, Government jobs, outcome of reservation, Solution to reduce discrimination and at the end, I gave my opinion on Reservation against merit or not?

Week: 4

In my last week of internship, I have been assigned the task of research. I was supposed to research 10 companies which are eligible for CSR, area of CSR of the companies, and the sector which they have invested in previous year and in which sector they are funding this year.

CONCLUSION

To be concluded, I have been assigned by many tasks related to content writing, research, social media campaigning and provided community service, and I performed all the task.

EXPERIENCE SHARING

Good things: NGO organized motivation and career guidance sessions of experts for all the interns and the NGO gave me a very good opportunity to develop my skills in the field of content writing and research.

Bad things: one mentor is handling about 100 interns together. So, it becomes difficult for them to address all quires of interns. There was some delay to get queries solved.



Ref No. : HP/INT/3516/2022

DATE: 02/03/2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Jay Chauhan**, has worked as a Social Entrepreneur intern **28/01/2022-28/02/2022** with our organization. **His primary work included Research, Social media campaigning, working on legal aspects, being a Social Entrepreneur and providing community service.** During his service we found him to be a hardworking and dedicated individual with punctuality and curiosity to learn. His contribution has been beneficial to our organization and he would be a valuable asset to any organization that he chooses to be a part of.

During his service, he was found punctual, hardworking and inquisitive.

We wish him a bright future ahead.

Anjali Mathur

Anjali Mathur

(President)

Hamari Pahchan NGO

Website:- www.hamaripahchan.org

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In association with:

Contact Us: 9911173557, 7800043888



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Website: www.thegalaxiesproduction.com; www.hamaripachan.com

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Now everyone can
make their own
'Pahchan'



NGO
HAMARI PHCHAN

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Contact Us: 9911173557, 7800043888



**Dean
Faculty of Law
Marwadi University
Rajkot**



Marwadi
University



Faculty of Law

FINAL INTERNSHIP REPORT

SUBMITTED TO:

MARWADI UNIVERSITY,

FACULTY OF LAW

IN PARTIAL FULFILLMENT OF REQUIREMENTS OF

B.A.,LL.B. (Hons.)

SUBMITTED BY:

AISHA ABDULGAFAR BELLO


ROLL NO: 92101040008

BATCH: 2021-2026

BA-LLB HONS

MARWADI UNIVERSITY

FEBRUARY, 2022


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Faculty of Law
Marwadi University
Rajkot

ACKNOWLEDGEMENT

I'm very glad that I have been able to conduct my first internship in an NGO successfully. It was not all because of my own effort, there has been a strong force from distinguished stakeholders who stood stiff behind this success.

First, I'm very much glad to acknowledge the effort of the Faculty of Law, Marwadi University for their continuous support that they have been rendering to me. I'm greatly impressed by the way the faculty has taken up responsibilities in making sure that everything goes in a straight line.

Secondly, I raise my hand of gratitude to Center for Human Rights and Social Advancement for being a guider and a source of knowledge for me. They have been very supportive and selfless in making sure I learn the best from them. The supervisor, in particular, has been of great importance to me. He is a good and reliable person who is devoted to ensure that all the interns get competent skill that could help them in their future life.

Lastly, it will be very mean if I don't acknowledge his ceaseless efforts. I'm greatly humbled by the steps that everyone took and sacrificed towards the realization of this tremendous success.

INTRODUCTION

I started my internship on 2nd February 2022 to 2nd of March 2022 at an NGO called Centre for Human Rights and Social Advancement (CEFSAN) which is a non-profit, non-governmental and non-partisan human rights organization working towards the promotion of human rights, democracy, good governance, and peace & security in Nigeria.

The Centre has also helped so many underprivileged people to get proper justice. Their vision is a society where human rights are held in high esteem, respected, promoted and guaranteed by all stakeholders.

The whole internship was very educative and enlightening. I learnt so many things concerning human and social rights. Again, I was able to interact with fellow interns through online meetings that were organized by the NGO which helped me to share notes and build networks with them.

INTERNSHIP WORK OVERVIEW

FUNDAMENTAL RIGHT UNDER THE NIGERIAN CONSTITUTION.

The fundamental rights are justiciable because when violated the aggrieved individual can move the courts for their enforcement.

Chapter IV of the 1999 Nigerian constitution guarantees the fundamental rights of citizens. According to Section 33 (1) every person has a right to life; Section 34 (1) every individual is entitled to respect for the dignity of his person; Section 35 (1) Every person shall be entitled to his personal liberty; Section 36 (1) In the determination of his civil rights and obligations, including any question or determination by or against any government or authority, a person shall be entitled to a fair hearing.

Section 37 (1) The privacy of citizens, their homes, correspondence, telephone conservation and telegraphic communications is hereby guaranteed and protected.

38(1) Every person shall be entitled to freedom of thought, conscience and religion, including freedom to change his religion or beliefs and freedom (either alone or community with others, and in public or in private) to manifest and propagate his religion or beliefs worship teaching, practice and observance.39(1) Every person shall be entitled to freedom of expression, including freedom to hold opinions and to receive and impart ideas and information without interference. 40(1) Every Person Shall be entitled to assemble freely and associate

with other person, and in particular he may form or belong to any political party, trade union or any other association for the protection of his interests.

41(1) Every citizen of Nigerian is entitled to move freely throughout Nigeria and to reside in any part thereof, and no citizen of Nigerian shall be expelled from Nigeria or refused entry thereby or exit therefore.

42(1)A citizen of Nigeria of a particular community, ethnic group, place of origin, sex, religion or political opinion shall not by reason only that he is such a person.

43(1) subjects to the provisions of its constitution, every citizen of Nigeria shall have the right to acquire and own immovable property anywhere in Nigeria. 44(1) no moveable property or any interest in an immovable property shall be taken possession of compulsorily.

45(1) Nothing in section 37,38,39,40 and 41 of this constitution shall invalidate any law that is reasonably justifiable in a democratic society.

46(1) Any person who alleges that any of the provision of this chapter has been, is being or likely to be contravened in any state in relation to him may apply to a High Court in that state redress

HOW TO COMMENCE CIVIL ACTION IN NIGERIA.

Commencement of a civil action is the process taken to institute an action before a competent court to determine the issues between parties.

There are 4 modes of commencing a civil action in court in Nigeria namely;

1. By Writ of Summons,

2. By Originating Summons,
3. By Originating Motion
4. By Petition.

Each of these approaches is based on the nature of the case at hand.

Before a civil action can be initiated in court, the litigant must evaluate a number of issues (person filing the action). The following are some of these elements summarized,

I. Cause of Action: these are the series of events or events that gave rise to a civil action. It forms the basis upon which a person is entitled to obtain a remedy against another in Court.

II. Jurisdiction: this factor is important to decide the court to commence the civil action. The law is clear on the importance of jurisdiction.

III. Limitation of Action: this is another important factor to be considered before commencing an action in court. There is a limitation period set for almost all actions that can be filed in court.

IV. Alternative Dispute Resolution (ADR): It is a duty of the counsel to ensure that all alternative dispute resolution methods have been explored before proceeding to file an action in court on behalf of a client.

V. Rules of the Court: every court in the legal system has rules that bind the Court, Litigants and Legal Practitioners. It is imperative that the provisions of the Rules are followed strictly when someone is proceeding to file an action in court.

CONCLUSION

Through the teachings by the organization, I have learned that some of the aims and objectives of the Centre for Human Rights and Social Advancement (CEFSAN) include:

1. To educate Nigerian citizens to understand and defend their fundamental rights and freedom
2. To monitor, document and report human rights violations in Nigeria.
3. To provide free legal aid to indigent victims of human rights abuses.
4. To sponsor and support programmes or activities aiming at promoting human rights, democracy and good governance in Nigeria.

I have learned the Fundamental Rights and also the rights that are justice-able and the non-justice-able. I also learned how to commence civil action in Nigeria under the Nigerian law.

I therefore thank Marwadi university, particularly the Faculty of Law, for having such a tremendous initiative for its students. Besides giving us practical experience, such opportunities help us to build connections with organizations and law firms who may be our future employers. Additionally, internships build up our CVs.

EXPERIENCE SHARING

It was a good opportunity to me that I have engaged myself with the Centre for Human Rights and Social Advancement (CEFSAN). It was a great pleasure for me to experience how the organization works and how it is always willing to help the underprivileged people to have access to justice.

It has been a great opportunity for me to experience how the organization works. And I'm looking forward to gain more knowledge in the upcoming weeks of this internship.

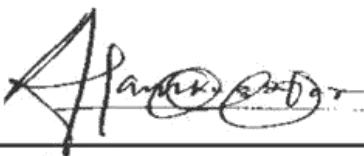
Human Right and social Advancement NGO has been my motivation and has taught me the essence of protecting human rights. The greatest motivation was how NGO is willing to help me to know many things about the Nigerian legal system. Secondly, the way in which the organization passes information to its interns are clear and explanatory. The Four weeks have been splendid.

Certificate OF INTERNSHIP

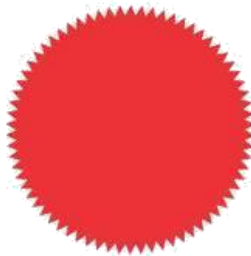
PROUDLY PRESENTED TO

Aisha Bello

THIS AWARD IS PRESENTED
FOR HER COMMENDABLE CONTRIBUTION TO CENTRE FOR
HUMAN RIGHTS & SOCIAL ADVANCEMENT (CEFSAN) DURING
HER 1 MONTH INTERNSHIP



YUSHA'U SANI YANKUZO, ESQ
EXECUTIVE DIRECTOR.



3RD MARCH, 2022

DATE:



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Marwadi University
Rajkot

FINAL INTERNSHIP REPORT



Marwadi
University

FACULTY OF LAW

NGO INTERNSHIP

SUBMITTED TO -

FACULTY OF LAW, MARWADI UNIVERSITY

IN PARTIAL FULFILLMENT OF REQUIREMENTS
OF B.A., LL. B (Hons.) DEGREE


SUBMITTED BY -

NAME - RAMANDEEP SINGH

ENROLLMENT NO. - 92121040002

PERIOD - 07.09.2021 to 05.10.2021

YEAR - 3rd


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**FACULTY OF LAW
MARWADI UNIVERSITY**

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1 - ACKNOWLEDGEMENT

I have undertaken various efforts in this project, and I am grateful towards people who have helped me throughout the project directly or indirectly. Specially I am grateful to Adv. Amit Sir, Adv. Afsana mam ,, who gave me the opportunity, guidance and inspiration to undergo project successfully.

I would like to extend my gratefulness to other associated people who helped me through various ways and by who's support it would not have been easy for me to complete my task at time. I would also like to thank faculty members of university who gave guidance on things how and what to be done. It was great experience over the interning span at "Independent Thought".

Ramandeep Singh

Signature of the Student

Date: 06/02/22

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- TABLE OF STATUTES

The Statutes that have been studied by me all through the internship have mentioned below:

1. The Children and Social Work Act, 2017

3

- ABBREVIATIONS

List of abbreviation used during the terms of Internship and also in the project has been provided below:

SC – Supreme Court

HC – High Court

ADJ – Additional District Judge

FIR – First Information Report

Adv. – Advocate

JMFC – Judicial Magistrate First Class

MM – Metropolitan Magistrate

Sr. – Senior

4

- INTRODUCTION

About the NGO where I worked:

“**Independent Thought**” is a National Human Rights organization working towards equity, justice and mutual respect. Independent Thought works on child rights law through direct Intervention and advocacy and provides technical and hand-holding support. As a human rights law organization we work towards legal reform and people centric policy formulations, through engagements with law students, lawyers, teachers, law schools and judicial intervention.

The Mission of the NGO is to create an atmosphere where critical thinking, independence of thought and action based on reason of every individual is equally respected and are not barred based on age, gender, class, caste, religion, race etc.

Independent Thought focuses on the "happy childhood" of Children from a legal lens based on the principles enshrined in the UN Convention on the Rights of the Child and Constitution of India. We believe that Best Interest of Children is paramount and touchstone for all policy and sustainable development

5 - INTERNSHIP WORK OVERVIEW

Under the guidance of Advocate Amit sir, I did case briefing and research work on child marriage.

The brief of work done during the internship has been explained below:

4.1 First Week–

On the first day of the internship, I was introduced to the Children and Social Work Act 2017, and was asked to collect cases and judgements pertaining to child marriage . The next day I did in depth research about The Children and Social Work Act 2017 for the purpose of making a PPT. Further, I submitted an edited and advanced Note on The Children and Social Work Act 2017. I started working on simplifying The Children and Social Work Act 2017 in the prescribed manner.

4.2 Second Week

In the second week of internship, I was asked to provide the list of cases of child marriage in the north east region of India and was also asked to provide statistical data that backed it up . I understood about Restrictions on practice and protected titles, Ensuring adequate provision of social work training and Social Work in England. I was then further asked to read and research more about the Act and child marriages

4.3 Third Week –

In the third week of internship, I was given the task to research on child protection rights during disasters and during emergencies, I made full fledged research on the same and submitted a well made research study

4.4 Fourth Week –

In the last week of Internship, during this final week I was asked to research upon child rights during emergency and provides statistical data that supported my research on the same and research on the matters that were concluded in it .

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- CONCLUSION

After interning for a month in “**Independent Thought**” NGO it can be concluded that the NGO is a National Human Rights organization working towards equity, justice and mutual respect. Independent Thought works on child rights law through direct Intervention and advocacy and provides technical and hand-holding support. As a human rights law organization we work towards legal reform and people centric policy formulations, through engagements with law students, lawyers, teachers, law schools and judicial intervention..

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- EXPERIENCE SHARING


It was a great experience as interning in Independent thought NGO under the guidance of Adv Amit . The fourth experience as an intern was quite good which resulted into rich outcome in practical as well as in theoretical aspect. The type of work allotted was very good and that really lead to increase in legal knowledge. And studying of the acts filled up my knowledge box and increased my acquaintance in legal field.

Thanking you in Anticipation.

Regards,

Ramandeep Singh

3rd Year – 5th Semester


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ANNEXURES

Exhibit 1

Child Protection and Rights during Disasters

During natural and man-made catastrophes, conflict, or other crises, child protection in emergencies is about preventing and responding to violence, abuse, exploitation, and neglect of children. Long after the main crisis has gone, emergency conditions can persist. They seek effective and long-term solutions to give short- and long-term protection to children living in disaster and conflict zones. The delivery of child protection\sin emergencies occurs in a wide variety of locations from the immediate locality of the crisis to internally displaced people and refugee facilities.

THERE ARE THE FOLLOWING RISKS TO CHILD RIGHTS DURING SUCH TIMES :-

1. Accidents and dangers -

Unintentional injuries account for nearly half of all deaths among children aged 10 to 14, and nearly half of all deaths among those aged 15 to 19. In emergency and conflict settings children are at greater risk of damage and impairment caused by natural catastrophes or by explosive remains of war. There is a higher risk of long-term or chronic harm in children if injuries are not treated swiftly and effectively for their age.

2. Child labour

Many child labourers are victims of the most heinous kinds of child labour, such as forced or bonded labour, the use of children in armed conflicts, human trafficking for exploitation, sexual exploitation, illicit work, or other forms of work that are harmful to their health, safety, or morals. Children are especially exposed to child labour in emergency situations. An emergency may increase the general incidence of child labor's worst forms, stimulate new types of hazardous employment, result in working children taking on more risky tasks, or result in children moving around unsafely in search of work, placing them at risk of exploitative work circumstances

3. Unaccompanied and separated children-

Children can become separated, abandoned, abducted, or orphaned by accident during a flight to safety or by the death of parents or guardians in a conflict or natural disaster situation. Children who are unaccompanied or separated from their parents are particularly vulnerable to exploitation and trafficking.

https://resourcecentre.savethechildren.net/sites/default/files/documents/what_is_child_protection.pdf

4. Sexual violence/abuse

Children are especially vulnerable to sexual violence and exploitation in the confusion that might follow an emergency. The social, physical, emotional, spiritual, and psychosocial impacts of sexual abuse on girls and boys necessitate a multi-sectoral response. In all emergency, sexual assault is present, but it is typically masked. In the aftermath of a crisis, harmful practises such as early marriage or female genital mutilation may become more common.

5. Physical violence and other harmful practices

Children may be subjected to terrible brutality during conflicts, including murder, maiming, torture, and kidnapping. In humanitarian circumstances, patterns of violence are amplified. Families and other sources of protection are frequently strained, and the child's weakened protective social structures may result in family or community members harming the child, putting that youngster at greater risk of domestic violence, physical and sexual abuse, and corporal punishment.

6. Children get associated with armed forces or armed groups

Despite increased international attention and widespread condemnation of the recruitment and use of children in conflict, children continue to be coerced into service with military forces or armed organisations all over the world. Boys and girls are utilised as combatants, active support roles such as spies, porters, and informants, as well as for sexual purposes. Children who are members of military forces or armed groups are frequently compelled to watch and perform acts of violence, as well as being abused, forced to take drugs, exploited, maimed, or even killed as a result.

7. Psychosocial distress and mental disorders

The stressful situations experienced in times of emergency can lead to short and long-term psychosocial distress and mental disorders such as sleeping problems, nightmares, withdrawal, problems concentrating, guilt, confusion, insecurity, and post traumatic stress hindering the successful future development of the child

Exhibit 2

CHILD RIGHTS PROTECTION ISSUES IN EMERGENCIES

Firstly we have to try and understand what goes on about and the hardships that children have to face due to some unavoidable circumstances in some states . Such as:-

Displacement, separation from family, accidents, and infections are all conditions that affect the safety and well-being of children in emergency situations, according to experience. More importantly, as a result of weakened child protection mechanisms, the occurrences of violence, exploitation, abuse, and neglect rise in the aftermath of a disaster. As a result, kid protection becomes a need and a top priority in times of crisis. As a result, UNICEF Pacific continues to support and help host nations and partners in their efforts to reduce the impact of disasters on children in the Pacific area.

The urgency of the situation necessitates that we work together to build better national child protection systems that can resist the stresses of emergencies and provide adequate protection to children at a time when they are most vulnerable.

Advocating for child safety in times of crisis and ensuring that humanitarian intervention prioritises children is a critical first step. Child protection must be integrated into all aspects of humanitarian work in the region, and children must be at the forefront of all emergency preparedness, response, and recovery operations.


WHATS IS CHILD PROTECTION DURING EMERGENCY .(CPiE)

In the aftermath of a disaster, child protection in emergencies (CPiE) refers to all efforts to prevent and respond to child abuse, neglect, exploitation, and violence. As a first stage, it entails ensuring that children receive the essential humanitarian assistance to ensure their safety and well-being. In emergency situations, CPiE emphasises the fulfilment of specific rights for children, notably those that protect children from maltreatment and secure their survival and well-being.

Situations or occurrences that pose a threat to a community's health, safety, security, or well-being, particularly for children, are classified as emergencies. They demand prompt and decisive action, particularly in the aftermath of a calamity. If we do not respond quickly and effectively to emergencies, they can quickly evolve into full-fledged humanitarian situations. Natural or man-made hazards can both contribute to them. Tsunamis, cyclones, earthquakes, floods, and other natural disasters are the most common causes of disaster emergencies

For a variety of reasons, CPiE is a major source of concern. Children are a particularly vulnerable demographic. They are even more vulnerable because of their reliance on adults and their need for care. Many variables raise a child's vulnerability in an emergency. Displacement, separation from family and community, the death of a parent or a loved one, and the loss of a house and belongings are all situations that might put a child's life in jeopardy. Because of their lack of safety and security, as well as their dependency on humanitarian aid, they are vulnerable to violence, exploitation, abuse, and other forms of injustice. In general, child protection services, such as security, justice, and social services, have been weakened

Children must be helped in an emergency through cautious measures that address their immediate needs while also


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protecting them from long-term harm. Because CPiE is a multi-sectoral field of work involving many players, we must all be ready to act and equipped with the resources necessary to give an effective and well-rounded response.

Children's life can be devastated by disasters, conflicts, and other crises. Children's protective structures and systems, as well as those that assist their positive development, are frequently weakened or broken.

As a result, children face new dangers include losing or being separated from their family, sexual exploitation, human trafficking, and recruitment into armed groups. Existing harmful behaviours (such as child marriage and hazardous labour) may also be intensified.

Plan International collaborates with children, their families, communities, and local governments to prevent and respond to child abuse, neglect, and exploitation through immediate, life-saving interventions. Our programmes ensure that children's protection requirements are met, with special attention paid to the unique threats that adolescent females confront.

Main Focus –

Changes in the global political climate, patterns in armed conflict and displacement, and developments in science and technology are all posing challenges to the humanitarian system. The international community has made a number of efforts to address these issues in recent years, including the Agenda for Humanity, a plan that outlines the changes required to alleviate suffering, reduce risk, and reduce vulnerability on a global scale.

For the humanitarian system, this is a pivotal crossroads. In 2016,

an estimated 65.6 million people were forcibly relocated due to persecution, conflict, violence, or human rights violations, with 24.2 million people displaced due to natural disasters [1,2].

Midway through 2017, at least 141.1 million people in 37 countries needed urgent humanitarian help, yet access to humanitarian aid is becoming more limited [3]. With refugee displacement lasting an average of more than ten years, minimum-standard measures designed to provide temporary respite have become fixtures in the life of entire new generations [4].


The most recent Emergency that brought huge risks to children is COVID 19

Children's rights, as enshrined in the UN Convention on the Rights of the Child (UNCRC), need to be respected, protected and fulfilled during times of crisis. The children who responded to the global survey made articulate and clear demands of their leaders to deliver on their rights.

Children demand action on education, including the re-opening of schools and improved distance learning, an acceleration in the response to the pandemic and increased access to healthcare, as well as a call for duty-bearers to prioritise poorer families with the provision of social protection.

Children are calling on duty-bearers to protect them from increasing violence as a result of COVID-19 and crucially, to honour their right to be heard and to participate systematically in public decision-making on issues that affect them

Health and nutrition during the pandemic


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Many children are expected to die from preventable causes during the COVID-19 pandemic as a result of the deprioritization of non-COVID related healthcare, lockdowns, and fear of getting the virus. Children's access to healthy nutrition is also threatened by food and economic insecurity, and malnutrition rates are likely to rise. COVID-19 has impacted 89 percent of respondents' access to healthcare, medicine, and medical supplies, according to the poll. This was especially true for children with chronic illnesses or impairments, as well as youngsters from low-income families.

Furthermore, nearly two-thirds (62%) of respondents claimed it is difficult to supply meat, dairy products, cereals, fruits, and vegetables to their family. The most common reason given was cost, with more than half (52%) of respondents stating that food is too expensive.

POVERTY STRICKEN CHILDREN DUE TO THE PANDEMIC

The COVID-19 health crisis swiftly turned into an economic crisis, with Save the Children estimating that the number of children living in poverty might rise by 117 million by 2020. Child poverty not only undermines a country's economic growth and social capital, but it also prevents children from accessing essential services such as health and education, as well as putting them at risk of abuse such as child labour and child marriage.

More than three out of four households said they had lost

money since the pandemic began, according to the poll. Income losses were more common in poorer households (**82 percent**) than in non-poor households (70 percent).

Urban families were also disproportionately affected by job loss, with respondents from urban regions over twice as likely (**61 percent**) as those from rural areas to indicate they had lost their work (**33 percent**).

Despite the fact that several governments and territories have introduced social protection measures since the virus's emergence, coverage is still insufficient. According to the poll, 70% of those who had suffered economic losses said they had not received government assistance.


CASE STUDY Of Children at Risk in PALESTINE .

Impacts of COVID-19 on children living in the occupied Palestinian territory (oPt)

Ahmed* is 14 years old. Two years ago, he was shot in his right leg during the Great March of Return demonstrations in Gaza. Ahmed underwent surgery multiple times, but he still needs medical care abroad. He is unable to travel since the coordination between Palestinian and Israeli authorities ended because of Israel's plans to annex parts of the West Bank.

“I have to travel abroad and have the nerve operation

because there are no specialists in Gaza. We are not equipped. Gaza is under siege...


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Coronavirus has affected my daily life, they closed the schools and checkpoints, universities, mosques, for example the physiotherapy [centre] has also been closed. I need treatment. Checkpoints were closed. I need to travel to have an operation. It really affected my life. I hope they find the medicine [I need].”

The closure of schools is also affecting the learning process for children in Palestine. More than half of parents surveyed in the oPt reported that their children were learning ‘just a little’ during this period, and one in every four children is having difficulty paying for learning materials. Given that 63% of households surveyed in the oPt mentioned a loss of income during the COVID-19 crisis, access to services including learning materials or healthcare, could also be affected.

“I love going to school. I’m in grade 9. I love to see my friends at school. I like Arabic language the most. Coronavirus has affected education so much. We used to go to school. We used to wake up early and go to school.”- 14-year-old Ahmed* at his home in Palestine

COVID-19 is also having an impact on children’s mental health and more psychosocial support is needed. More than half (56%) of children in the oPt said they were more worried than before, and 77% of parents and caregivers indicated that their children were showing an increase in negative feelings.

“My message to all the children around the world whose lives have been affected is - don’t give up. God is testing your life. Be strong, be brave, keep it up. Continue with your life. Try to live a normal life. Be successful.

Conclusion of the Study

The Save the Children US Ethics Review Committee gave their approval to this study (SCUS-ERC-FY2020-33). Local Independent Review Boards in all nations where the research was carried out that had locally operated Independent Review Boards also gave their approval. Save the Children recognises that the survey might have included additional information. However, due to the study's broad breadth and ethical issues, additional questions about gender diversity, sexual orientation, and other factors were not included.

Effect of the Pandemic on Children And their Rights in India

Saraswati Pagade, a member of the YUVA (Youth for Unity and Voluntary Action) Navi Mumbai Childline team, first sensed something was wrong when she noted an increase in the number of youngsters begging near her workplace in Kharghar, Maharashtra's Raigad district.

There is so much hunger here,” said Pagade. “There is no money for food.” On the 1098 Childline number that YUVA attends to, calls reporting children begging and child labour have shot up since Covid’s catastrophic second wave in May, she said.

Siblings Abid*, 10, and his older brother Zahid, 12, began working in a glass bangle factory in Jaipur, Rajasthan, more than 1,100 kilometres north, two months after their father, a daily wage labourer, died of Covid-like symptoms—he was

never medically diagnosed or treated—in April 2020 in
Dhanarua Block, Patna, Bihar.

When the schools closed and their father died, the boys were in classes 3 and 5. The youngsters were sent to work after the family's single breadwinner died. The brothers were rescued by a local NGO and reconnected with their mother in April this year, just as the second wave was preparing to erupt, according to Suresh Kumar, executive director of Centre DIRECT, a Patna-based NGO that helps kidnapped children reconstruct their lives

EXHIBIT -3

CHILD MARRIAGES IN NORTH EAST

According to 'A Statistical Analysis of Child Marriage in India Based on Census 2011' report published by Young Lives and National Commission for Protection of Child Rights (NCPCR) in June 2017, three states of the region – **Tripura (21.6%), Assam (16.7%) and Arunachal Pradesh (12.1%)** – recorded child marriage and teen pregnancy rates higher than the national average.

According to the report, nine districts from Assam (Goalpara, Dhubri, Bongaigaon, Morigaon, Barpeta, Kokrajhar, Chirang, Golaghat and Nagaon) and four districts from Tripura (Dhalai, South, North and West Tripura) were among the 100 high child marriage prevalent districts in the country.

Further analysis of number of children born to teenage mothers revealed that **27.3% of married teenage girls had given birth to one child, while 4.2%** of married girls had two or more children.

The patterns of children ever born among these girls differed across different states in India. Findings revealed that there are 12 states where more than **40% of these girls had at least one child or more.**

Interestingly, there was an emergence of states such as Mizoram (61%) and Meghalaya (53%) with the

highest prevalence of teenage pregnancy among early married girls.

Assam's additional chief secretary of social welfare department Jishnu Baruah held a meeting with the administrative staff in Dhubri district earlier this month. He admitted that the government has faced tremendous challenges to eradicate child marriage in Dhubri district, which borders Bangladesh. "Every second marriage is a child marriage in Dhubri," he had said. It is one of the minority concentrated districts of Assam with close to 75% of Muslim population. The NCPDR report suggested that there existed a correlation between child marriage and the educational attainment of girls. The completion of secondary education was found to be significant in delaying the age for marriage. Prevalence of child marriage was found to be more common in rural areas than urban pockets.

As per National Family Health Survey (NFHS-4), (2015-16), 11.9% of the 15- to 19-year-old girls were married before 18 years in India, with variations across states.

According to NFHS-4, 33% girls in Tripura married before 18 years, which was followed by Assam at 31%. While the NFHS-3 was held in 2005-2006, when Tripura and Arunachal Pradesh both topped the list with 42% prevalence of girls getting married before 18

years of age, the percentage in Arunachal Pradesh has now dipped to 24%, but Tripura has shown slow

progress of reducing 9% prevalence of child marriage during the same period. A majority of the states have over time shown improvement with awareness and development.

Only Manipur had a marginal rise in percentage. Earlier, Manipur had 12.9% instances of child marriages; the figure is now at 13.7%.

The NCPDR report further revealed that the highest prevalence of child marriage is reported among Scheduled Tribe (ST) girls (15%) followed by Scheduled Castes (SC) at 13%.

In Arunachal Pradesh, 72% of the sample aged between 15 and 19 years, who had child marriages, belonged to STs.

While teenage pregnancy cases dropped by nearly 10% in Sikkim, which is the highest in Northeast, it rose by less than half a percentage in Tripura, Meghalaya and Manipur. At 0.3%, Tripura and Meghalaya saw the highest rise between NFHS-3 and NFHS-4 data. While the rate of teenage pregnancy in Tripura rose to 18.8% in NFHS-4 from 18.5% in NFHS-3, it increased to 8.6% from 8.3% in Meghalaya. Manipur also recorded an increase by 0.1% to 7.4% in 2015-16 from 7.3% during the same period.

It is important to examine the factors that lead to early marriage in different Northeast states. NFHS-4 data

revealed that prevalence of girl child marriage in the age-group 15-19 years is significant in rural areas across Northeast. However, Mizoram and Manipur have large pockets of child marriages within urban areas. Mizoram recorded 49% urban child marriage followed by Manipur at 32%. Assam and Meghalaya both had the highest number of rural child marriage cases.



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COURSE COMPLETION CERTIFICATE

This is to certify that **Mr./ / Mrs. RAMANDEEP SINGH**

of B.A.LL.B.(Hons.) has successfully completed the course INTERNSHIP (NGO) in fulfillment of the requirements for the completion of 2nd Semester 2021 Batch with Enrollment No. **9212104002**

Date: 01/03/2022

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**1.3.4 Approval from concerned HOD along with Project
Report/Completion certificate**



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CAKE STORE

By

JAY SAVLANI - 91800133038

Guided By

Prof. Dharmendrasinh Zala

A Thesis Submitted to

**Marwadi University in Partial Fulfillment of the Requirements for the Bachelors of
Technology in Information Communication and Technology**

April, 2022



MARWADI UNIVERSITY

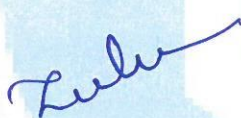
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Date: 28/04/2022
Place: Marwadi University



Prof. Dharmendrasinh Zala



Prof. Chandrasinh Parmar

Seal of Institute

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Place: Marwadi University

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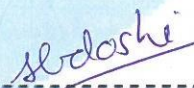
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Date: 28/04/2022

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Jay Savlani

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Zala

Prof. Dharmendrasinh D Zala

PEO, PO and PSO

Program Educational Objectives (PEO):

Our graduated students are expected to fulfill the following Program Educational Objectives (PEOs):

1. **Core Competency:** Successfully apply fundamental mathematical, scientific, and engineering principles in formulating and solving engineering and real life problems for betterment of society.
 2. **Breadth:** Will apply current industry accepted practices, new and emerging technologies to analyze, design, implement and maintain state of art solutions.
 3. **Professionalism:** Work effectively and ethically in an ever changing global professional environment and multi-disciplinary environment.
 4. **Learning Environment:** Demonstrate excellent communication and soft skills to fulfill their commitment towards social responsibilities and foster life-long learning.
 5. **Preparation:** Promote research and patenting to enhance technical and entrepreneurship skills within them.
- Function and communicate effectively to solve technical problems.
 - Advance professionally to roles of greater computer engineering responsibilities, and/or by transitioning into leadership positions in various industries such as business, government, and/or education.
 - Prepare for entrepreneurship skills by demonstrating commitment to community by applying technical skills and knowledge to support various service activities.
 - Place themselves in positions of leadership and responsibility within an organization and progress through advanced degree or certificate programs in engineering, business, and other professionally related fields.
 - Participate in higher study by the process of life-long learning through the successful completion of advanced degrees, continuing education, and/or engineering certification(s)/licensure or other professional development.

Program Outcomes (POs):

Engineering Graduates will be able to:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs):

PSO1: Students shall demonstrate skills, the knowledge and competence in the analysis, design and development of computer based systems addressing industrial and social issues.

PSO2: Students shall have competence to take challenges associated with future technological issues associated with security, wearable devices, augmented reality, Internet of Anything etc

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ABSTRACT

The Cake Store is a React-based Ecommerce website intended for online bakers. The main objective of this web application is to make it interactive and easy to use. It would make searching, viewing, and selecting a cake easier.

It contains arranging usefulness for clients to sort cakes intended for their requirements. The category filter and price filter give a simple and helpful method for arranging cakes where a client can sort for a cake intelligently and the filter would refine the cakes accessible in light of the client's feedback.

The client can then see the total particular of each cake. They can likewise see the cake reviews. The application additionally gives a shopping cart highlight with the goal that a client can add a cake to the shopping cart by tapping the thing on the shopping cart. The fundamental accentuation lies in giving an easy to use web application for really showing the ideal outcomes.

COMPANY PROFILE

Professional Soft-Tech is a leading IT Consulting company & one-stop solution for web and mobile apps developers based in Singapore, the USA, and India. We are providing end-to-end distinct web application development and mobile application development services to shape your business. Our primary work is done in Laravel framework, React development, React Native, iOS & Android mobile apps development.

We are a full-service web and app development company, with a satellite office deep in the urban skylines of the United States, Singapore, and India. Having worked with hundreds of people and companies from all over the world, we know how to build the best for you. More than that, we speak neutral English – no jargon and don't mind going the extra mile to convey what you and your business need. That's what makes us the best of the rest.

We know how hard it is to pick a good team of developers and designers. At Professional Soft-Tech we provide quality service, easy to work with, and deliver on time as claimed at a reasonable price. And for the rest, our work speaks!

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1. Introduction

This is the final report document for the developed Cake Store for Bakery owners. It consists of the milestones in the development of a finalized online cakes shopping system.

Web based shopping is the spot by which customers straightforwardly purchase labor and products from a dealer progressively, without a go-between administration, over the Internet. It is a form of electronic commerce. It helps buy cakes anywhere on the internet by using an android device. Thus, the user will get the service of online shopping for his favorite cake.

1.1 Project Summary

The "**Cake Store**" is developed to override the problems prevailing in the practicing manual system. This software is supported to eliminate some hardships faced by this existing system.

Cake Store is a React-based ECommerce website that helps users with finding the cake and browse all cakes. Users can add the Cake to the Cart list and place the order.

1.2 Purpose

The main objective of this project is to find and place orders of cake easily and make the site user-friendly. The purpose of the project is to reduce the manual work of managing the orders of the cake. It tracks every one of the insights concerning the order.

There are a lot of motivations behind a web application, the vast majority of which can be bound to one objective, procuring benefits.

1.3 Scope

This system allows the user to maintain their cart for adding or removing the cake over the internet.

It may help collect perfect management in detail. In a very short period, the collection will be obvious, simple, and sensible. It will help a user to know the management of the past year perfectly and vividly. It also helps in current work relative to the Cake Store System. It will likewise decrease the expense of gathering the administration and assortment methodology will continue without a hitch.

1.4 Technology Review

- As part of technology, **PERN Stack** is used to develop the entire system.
- **React JS** is used to develop the front-end of the system.
- **Node JS** is used to handle the server side of the system.
- **Express JS** is used to develop the Rest API of the system.
- For data storage, **PostgreSQL** is used to develop a database.

2. Project Management

Project management is the discipline of starting, arranging, executing, controlling, and shutting crafted by a group to accomplish explicit objectives and meet explicit achievement measures at the predefined time.

2.1 Project Planning

For a successful software project. the following steps can be followed:

- Select a project
 - Identifying project's aims and objectives
 - Understanding requirements and specifications
 - Methods of analysis, design, and implementation
 - Testing techniques
 - Documentation
- Project milestones and deliverables
- Budget allocation
 - Exceeding limits within control
- Project Estimates
 - Cost
 - Time
 - Size of code
 - Duration
- Resource Allocation
 - Hardware
 - Software
 - Previous relevant project information

2.2 Project Scheduling

- A Gantt diagram or Timeline graph for the advancement plan is given underneath.
- The arrangement makes sense of the assignments versus the time (in weeks) they will take to finish.

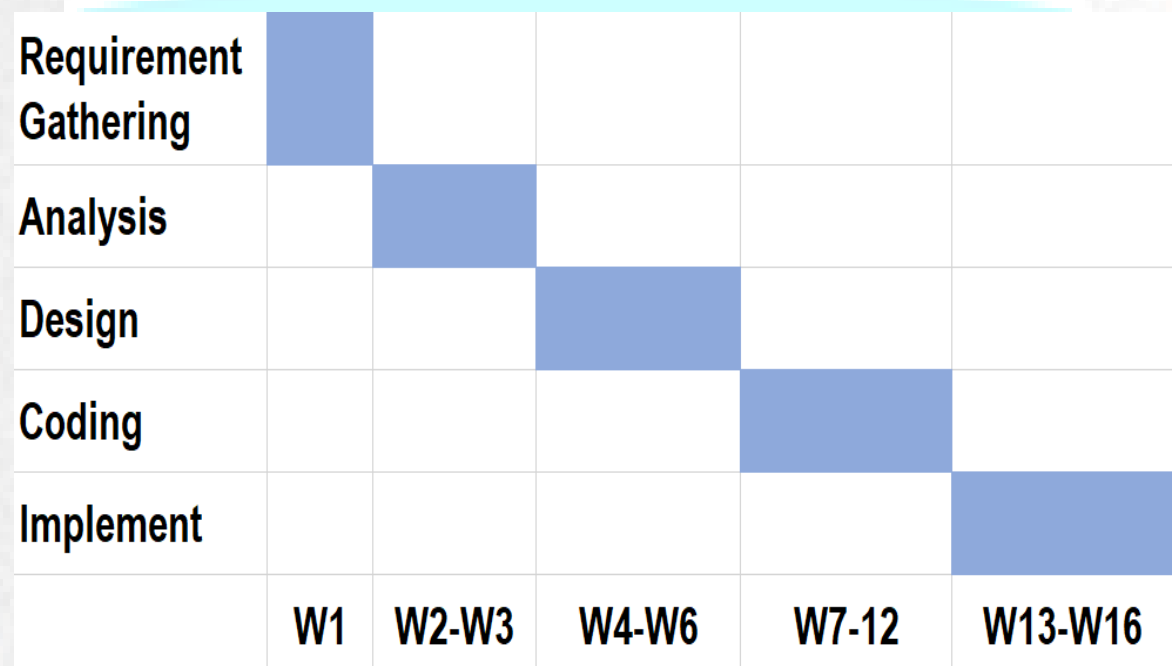


Figure 2.1.1 Gantt chart

2.3 Project Development Approach

Agile:

The Agile model accepts that each undertaking should be dealt with distinctively and the current strategies should be custom-made to best suit the venture prerequisites. In Agile, the assignments are partitioned into time boxes (humble casings) to convey explicit elements for a delivery.

Advantage of Agile model:

- Customer satisfaction by rapid, continuous delivery of useful Web portal Updates.
- Individuals and associations are underlined instead of interaction and devices.
- Clients, engineers and analyzers continually interface with one another.
- Working web portal updates will be delivered frequently (weeks rather than months).
- Close, daily cooperation between investors, publishers and developers.
- Perpetual mindfulness with respect to particular significance and well thought out plan.
- Standard variation to evolving conditions, Graphics API, Engines.
- Late changes in requirements will be accommodated

2.4 Roles and Responsibilities:

1. Requirement Analyst

A Requirement Analyst capable of viewing the current world view and designing an infotainment product which is entertaining and Useful along with being capable of helping the user psychologically.

2. Database Designer

A database Designer for designing databases using the PhpMyAdmin tool.

3. Web Designer

A Web Designer who can give Layout to the web by placing every right block at the right place turning the web into a real application.

3. System Requirements Study

A software requirements specification (SRS) is a record that depicts what the product will do and how it will be normal to perform. It additionally depicts the usefulness the item needs to satisfy all partners (business, clients) needs.

3.1 User Characteristics

- User should be familiar with the given below categories
 - Login
 - Register
 - Forgot Password
 - Cart
 - Checkout
 - Logout

3.2 Hardware Requirements

- Intel Core Pentium or Above (**Recommended Core i3 or Above**)
- Minimum 60 GB Hard disk
- Minimum 2GB of RAM (**Recommended 4GB RAM**)
- Mouse, Keyboard, Monitor
- 4x CR-ROM drive OR USB port

3.3 Software Requirements

- Windows 7,8,10,11, Ubuntu, macOS
- Mozilla Firefox, Opera, Chrome on any latest version of Browser
- Node JS
- PostgreSQL
- Visual Studio Code
- DBeaver CE



4. System Analysis

4.1 Study of Current System

- **Home** - This module has information regarding the Cake such as its name, description, price information, its features etc.
- **Profile** – This module helps the user to see their profile.
- **Shipping & Checkout** – Using this module, user can purchase the cake and checkout.
- **Order Management** – In this module, the order will be tracked for each user and also shipping will be tracked.
- **Payment Gateway**– Users are able to pay online money for purchased cake.
- **User Management** – In this module, admin can add, edit or delete the users.
- **Category Management** - In this module, admin can add cake categories.

4.1.1 Features

Features are the "apparatuses" you use inside a framework to finish a bunch of undertakings or activities.

There are 3 Logins:

- Admin
- Registered Users
- Guest Users

Features for Users:

- Users can register themselves.
- Users can login with email and password/ Google Id.
- Forgot Password
- Change Password
- View Cakes
- Add Cakes to Cart
- Manage Cart
- View Previous Orders
- Manage Payment

Features for Admin:

- Admin can create Cake category
- Manage Categories
- Manage Users
- Create Cake
- Create discount
- Manage Cakes
- Manage User roles
- Manage payment
- Manage Stock
- Manage Pages
- Manage Orders
- Change Password
- Admin Dashboard

Feature for Guest User

- Visit the website
- Register themselves
- View Cakes

4.2 Problem and Weaknesses of Current System

- Online customers don't genuinely assess or take a stab at the things being considered for procurement.
- Online customers at times lose the ability to arrange the cost and installment terms that might exist in neighborhood stores.
- Restocking and transporting costs are in many cases charged on returns.
- It is in some cases simpler to get cash discounted locally when the thing bought drops in cost inside the dependable cost period.
- Lack of significant discounts in online shops
- Frauds in online shopping

4.3 Use Case Diagram

The Use Case diagram models the users' expectations for using the system. The highlights of the framework that the actors use are called use cases. Some utilization cases cooperate with other use cases, a relationship displayed utilizing reliance bolts.

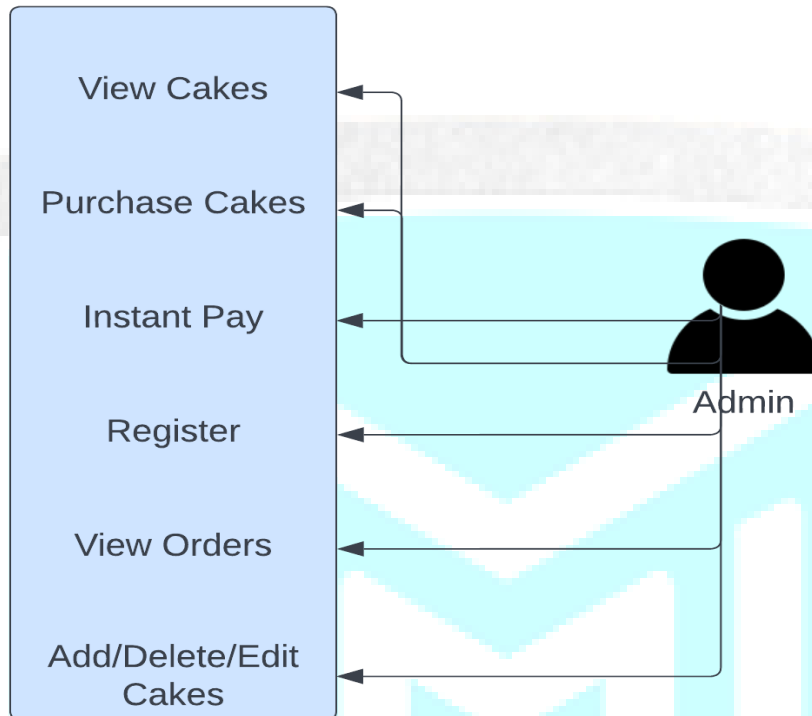
Admin:

Figure 4.3.1 Use Case Diagram for Admin

Users:

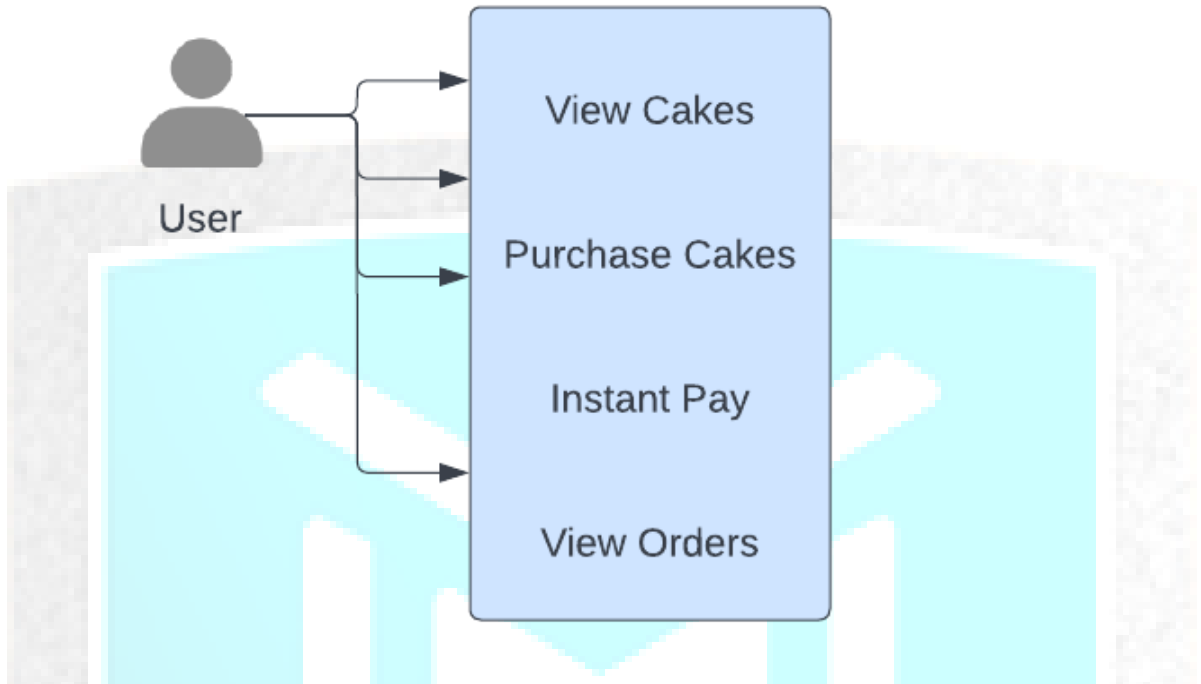


Figure 4.3.2 Use Case Diagram for User

Visitors:

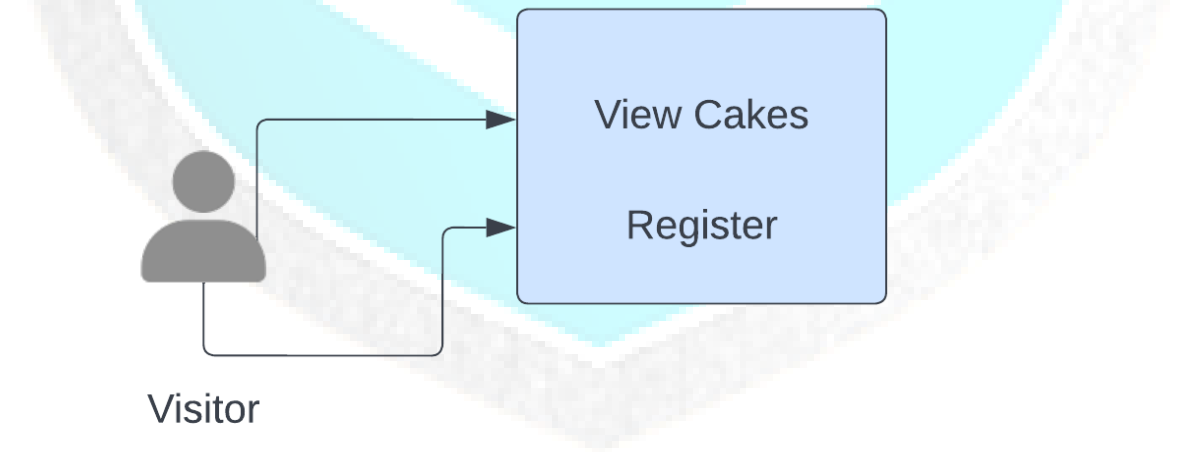


Figure 4.3.3 Use Case Diagram for Visitor

4.4 Data Modeling

Data modeling is the method involved with making an improved on chart of a product framework and the information components it contains, utilizing message and images to address the information and how it streams. Information models give a diagram to planning another data set or reengineering an inheritance application.

4.4.1 Data Dictionary

- Users**

Column Name	#	Data type	Identity	Collation	Not Null	Default	Comment
123 user_id	1	serial4			[v]	nextval('users_user	
ABC password	2	varchar(200)		default	[]		
ABC email	3	varchar(100)		default	[v]		
ABC fullname	4	varchar(100)		default	[v]		
ABC username	5	varchar(50)		default	[v]		
ABC google_id	6	varchar(100)		default	[]		
roles	7	_varchar		default	[v]	'{customer}'::chara	
ABC address	8	varchar(200)		default	[]		
ABC city	9	varchar(100)		default	[]		
ABC state	10	varchar(100)		default	[]		
ABC country	11	varchar(100)		default	[]		
created_at	12	timestamp			[]	CURRENT_TIMESTA	

Figure 4.4.1 Users Database Table

- Products**

Column Name	#	Data type	Identity	Collation	Not Null	Default	Comment
123 product_id	1	serial4			[v]	nextval('products_f	
ABC name	2	varchar(50)		default	[v]		
123 price	3	float4			[v]		
ABC description	4	text		default	[v]		
ABC image_url	5	varchar		default	[]		
ABC category	6	varchar		default	[]		

Figure 4.4.2 Products Database Table

- **Reviews**

Column Name	#	Data type	Identity	Collation	Not Null	Default	Comment
123 user_id	1	int4			[v]		
ABC content	2	text		default	[v]		
123 rating	3	int4			[v]		
123 product_id	4	int4			[v]		
🕒 date	5	date			[v]		
123 id	6	int4			[v]		

Figure 4.4.3 Reviews Database Table

- **Orders**

Column Name	#	Data type	Identity	Collation	Not Null	Default	Comment
123 order_id	1	serial4			[v]	nextval('orders_orc	
123 user_id	2	int4			[v]		
ABC status	3	varchar(20)		default	[v]		
🕒 date	4	timestamp			[v]	CURRENT_DATE	
123 amount	5	float4			[]		
123 total	6	int4			[]		
ABC ref	7	varchar(100)		default	[]		
ABC payment_met	8	payment			[]		

Figure 4.4.4 Orders Database Table

- **Order_items**

Column Name	#	Data type	Identity	Collation	Not Null	Default	Comment
123 id	1	serial4			[v]	nextval('order_iter	
123 order_id	2	int4			[v]		
123 product_id	3	int4			[v]		
123 quantity	4	int4			[v]		

Figure 4.4.5 Order items Database Table

- **Cart**

Column Name	#	Data type	Identity	Collation	Not Null	Default	Comment
123 id	1	serial4			[v]	nextval('cart_id_ser	
123 user_id	2	int4			[v]		

Figure 4.4.6 Cart Database Table

- **Cart_items**

Column Name	#	Data type	Identity	Collation	Not Null	Default	Comment
id	1	serial4			[v]	nextval('cart_item_	
cart_id	2	int4			[v]		
product_id	3	int4			[v]		
quantity	4	int4			[v]		

Figure 4.4.7 Cart items Database Table

- **Reset_Tokens**

Column Name	#	Data type	Identity	Collation	Not Null	Default	Comment
id	1	serial4			[v]	nextval("resetToke	
email	2	varchar		default	[v]		
token	3	varchar		default	[v]		
used	4	bool			[v]	false	
expiration	5	timestamp			[]		

Figure 4.4.8 Reset Token Database Table

4.5 Functional and Behavioral Modeling

Functional modeling happens after the framework's prerequisite definitions have been recognized by utilizing the different necessity gathering strategies accessible. Prerequisite social event is the initial phase in framework investigation and plan and is utilized to comprehend what the framework should do.

4.5.1 Data Flow Diagram

- Admin

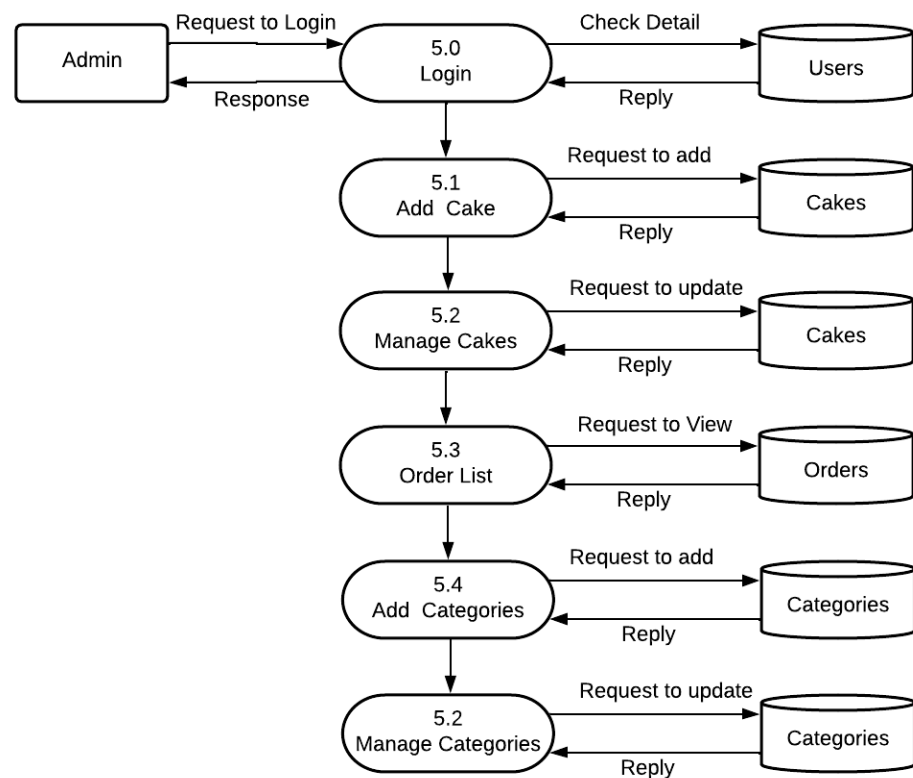


Figure 4.5.1 Data Flow Diagram for Admin

- User

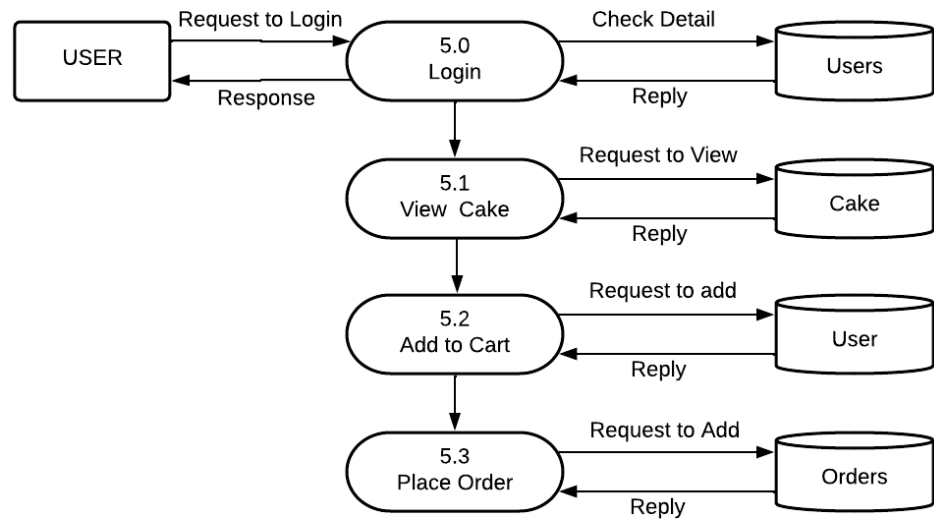


Figure 4.5.2 Data Flow Diagram for User

4.5.2 Context Diagram

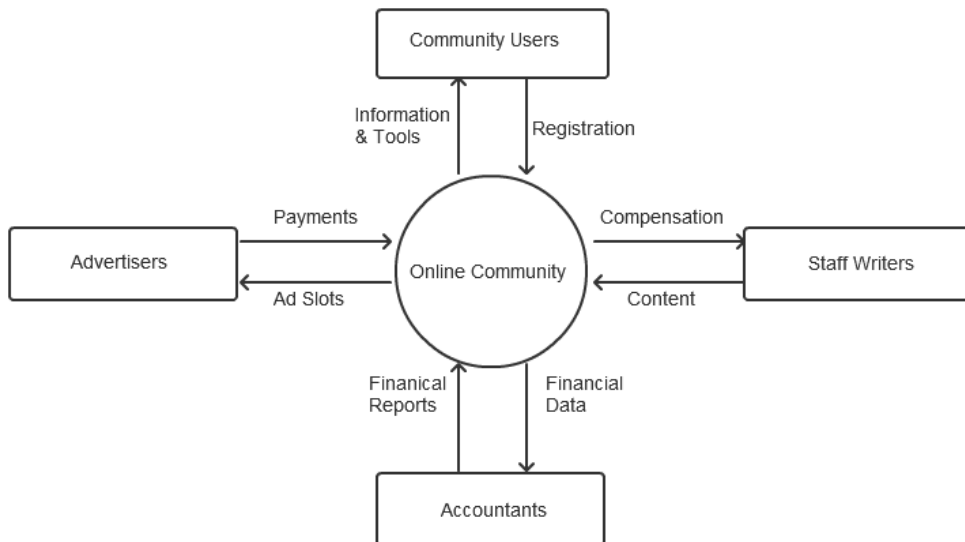


Figure 4.5.3 Context Diagram

4.6 ER Diagram

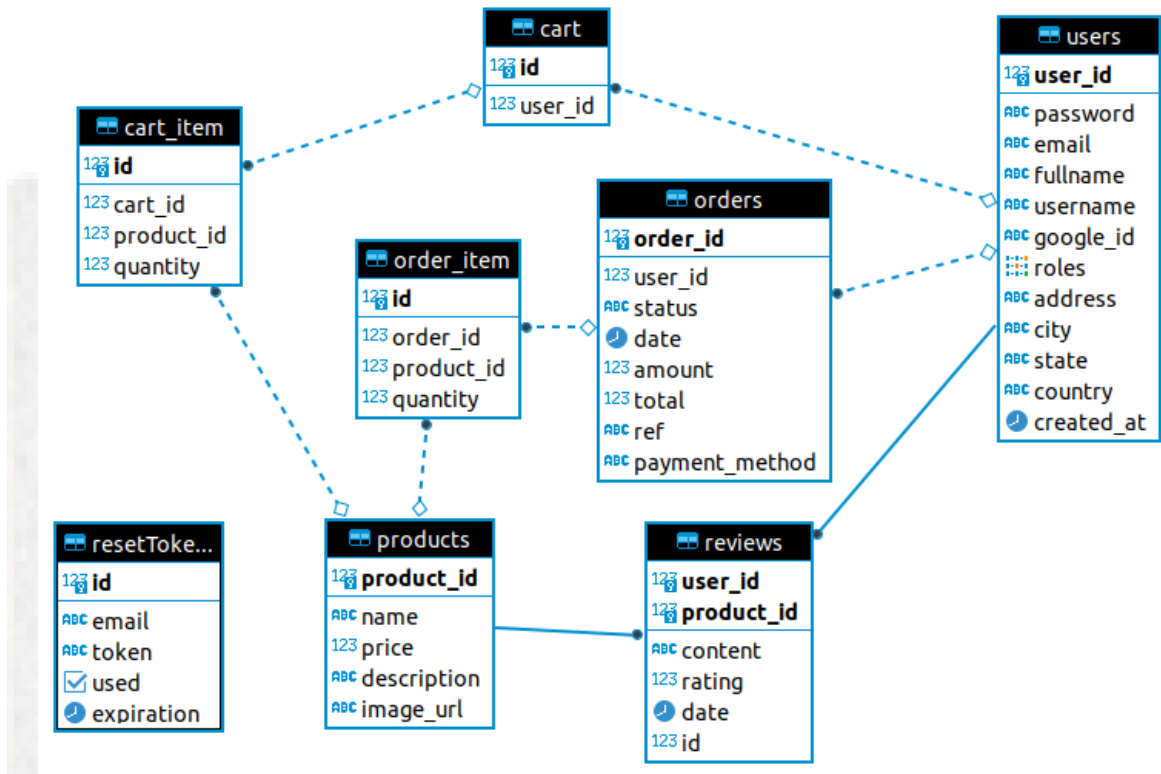


Figure 4.6.1 ER Diagram

5. System Design

Systems design is the method involved with characterizing the engineering, item plan, modules, connection points, and information for a framework to fulfill indicated prerequisites. Frameworks configuration should have been visible as the use of frameworks hypothesis to item improvement.

5.1 Existing system

In the existing system, all the records are not kept perfectly because all the work is done manually by the bakers, so keeping up to date details of the cakes, price, stock availability, price of different cakes in real time, user demands, cake delivery is not handled alone by a single entity. Amount of the overall profits and revenue generated are kept in documents and the calculations done are manually which may lead to huge mistakes.

Thus, the existing system is very time consuming and manual work sometimes leads to great loss because humans tend to make mistakes.

5.2 Proposed System

The proposed system is highly automated and makes shopping much easier and flexible and fast. The user can get the very accurate information at the right time. Users can get the knowledge of the various cakes they are going to buy which are available on the website because they might not know of that cake yet. This will increase the trust of the customer into the retailer as well.

Once the orders are confirmed all the address details, customer details and payment details are valid for the user buying, the user will receive confirmation by mail as

well as text message. They just need to click once using the mouse and everything is made available to them.

5.3 Input/output and Interface Design

It is a two-way correspondence. Input information and guidance (what clients need to do) go into the framework in many structures. Framework answers with yields, blunder messages, input, cautioning, help capacities, and so on. Additionally the point of interaction incorporates how clients explore through the framework. It may very well be orders, menus, or connections that lead clients to the following screen. It is a design of the framework from clients' view point (while DFDs and Flowcharts are the construction of the framework from developers' view focuses).

5.3.1. Samples of Interface

User interface needs keyboard and mouse if they are using the laptop or the desktop by using these they can add, delete or use this portal to order their desired product or they can check availability , admin can check the user and give them details about these cakes and by guest login the person can see the cakes with all details about cake like can see their price of the selected cake and then check availability of the cakes or they can also make inquiry of the selected cakes. In User login they can register themselves, manage cart and favorites, check availability of the cakes, if they forgot their password they can also change their password using the forgot password functionality, check their orders and availability of the cakes. So, this is the main functionality of the website. This website can make the user and admin work easily and it also makes the data manage easily. So, this is the main user interface of the portal.

5.3.2 Access Control and Security

Security access control is a significant part of any system. Security access control is the demonstration of guaranteeing that a confirmed client gets to just what they are approved to and no more. The bad news is that security is rarely at the top of people's lists, although they mention terms such as data confidentiality, sensitivity, and ownership and they quickly become interested. Fortunately there is a wide scope of procedures that you can apply to assist with tying down admittance to your framework.



6. Implementation Planning and Details

An implementation plan— otherwise called a smart course of action — frames the means your group ought to take while achieving a common objective or goal. This plan joins methodology, interaction, and activity and will incorporate all pieces of the task from degree to financial plan and then some.

6.1 User Base

The environment will allow a user to access the system from anywhere. Each user can order any of the available cakes and they can manage the orders and also see the cakes. This all functionality can be used from anywhere and they can access from anytime and many numbers of users can access this website only if they require full network connectivity or High-speed internet in phone.

6.2 User Interface

User interface needs keyboard and mouse if they are using the laptop or the desktop by using these they can add, delete or use this portal to order their desired cake or they can check availability , admin can check the user and give them details about these cakes and by guest login the person can see the cakes with all details about cake like can see their price of the selected cake and then check availability of the cakes or they can also make inquiry of the selected cakes. In User login they can register themselves, manage the cart and favorites, check availability of the cakes, if they forgot their password so they can also change their password using the forgot password functionality, check their orders and availability of the cakes. So, this is the main functionality of the website. This website can make the user and admin work easily and it also makes the data manage easily. So, this is the main user interface of the website.

6.3 Function Organization

We can make a useful part of React by composing a JavaScript work. These capacities might possibly get information as boundaries. In the practical Components, the return esteem is the JSX code to deliver to the DOM tree.

6.4 Naming Conventions

The main letter of each word in a name (for example type or variable) is promoted, and there is typically no highlight between words. For instance, Cake and UPrimitiveComponent, however not lastMouseCoordinates or delta_coordinates. Type names are prefixed with an extra capitalized letter to recognize them from variable names. For instance, FSkin is a short name, and Skin is an occasion of a FSkin.

6.5 Security Features

A fundamental guideline hidden the security of PC frameworks has generally been that of 'disconnection' basically eliminating the whole framework to an actual climate wherein vulnerability is acceptably limited. The rising utilization of frameworks wherein some gear parts, for example, client access terminals, are generally spread geologically has presented new intricacies and issues. These issues are not agreeable to arrangements through the rudimentary protection of actual segregation.

In one sense, the extended issues of safety incited by asset sharing frameworks may be seen as the cost one pays for the benefits these frameworks bring to the table. Nonetheless, seeing the inquiry from the part of such a shortsighted compromise darkens more basic issues. To begin with, the security issue isn't exceptional to any one sort of PC framework or design. The present computational innovation has filled

in as an impetus for r zeroing in consideration on the issue of safeguarding ordered data occupant in PC frameworks.

6.6 Coding Standards

We have a couple of basic coding norms and shows. Scarcely any product is kept up with for what seems like forever by the first creator. Code shows work on the clarity of the product, permitting designers to see new code all the more rapidly and completely. Assuming that we choose to open source code to mod local area engineers, we believe it should be handily perceived. A large number of these shows are really expected for cross-compiler similarity.

7. Testing

Testing is the most common way of scrutinizing an item to assess it", where the "questions are things the analyzer attempts to do with the item, and the item replies with its way of behaving in response to the examining of the analyzer. Although the majority of the scholarly cycles of testing are almost indistinguishable from that of survey or review, the word testing is suggested to mean the unique examination of the item dragging the item through some serious hardship. The nature of the application can and ordinarily change broadly from one framework to another yet a portion of the normal quality credits incorporate dependability, solidness, convenience, practicality and convenience. Testing helps is Verifying and Validating assuming the Software is filling in as being working is planned. This includes utilizing Static and Dynamic techniques to Test the application. Testing ought to deliberately reveal various classes of blunders in a base measure of time and with a base measure of exertion. An optional advantage of testing is that it exhibits that the product seems, by all accounts, to be functioning as expressed in the details. The information gathered through testing can likewise give a sign of the product's dependability and quality. In any case, testing can't show the shortfall of imperfections. it can show that product abandons are available.

7.1 Testing Plan

The main goal of the test plan is to include all the details related to testing such as what to test, when to test, how to test and who will be the tester. Test plans are often not updated but if there is some new feature or change introduced then it has to be updated accordingly.

7.2 Testing Strategy

A test system is a framework that portrays the testing approach of the product advancement cycle. It is made to illuminate project supervisors, analyzers, and engineers about a few main points of interest of the testing system. This incorporates the testing objective, techniques for testing new capacities, all out time and assets expected for the venture, and the testing climate.

7.3 Testing Methods

Testing methodologies are the methods that are utilized to test the practical and non-useful prerequisites of a Product. Every strategy has its own characterized expectations to guarantee that the normal item is conveyed to the client.

Branch Testing: Each branch of application that is corporate dealing solution is working correctly and navigation take place easily.

Bottom up Testing: We tested each part separately and then integrated them into appropriate modules and testing is done also at module level and at the end each and every module is integrated with each other for complete functionality of the system. Entire system is then tested by many users to find bugs.

System Work Performance Testing: System work performance testing is done by many users for appropriate working of applications and to remove problems that may possibly be faced by a user.

8. Screenshots

- **Login:**

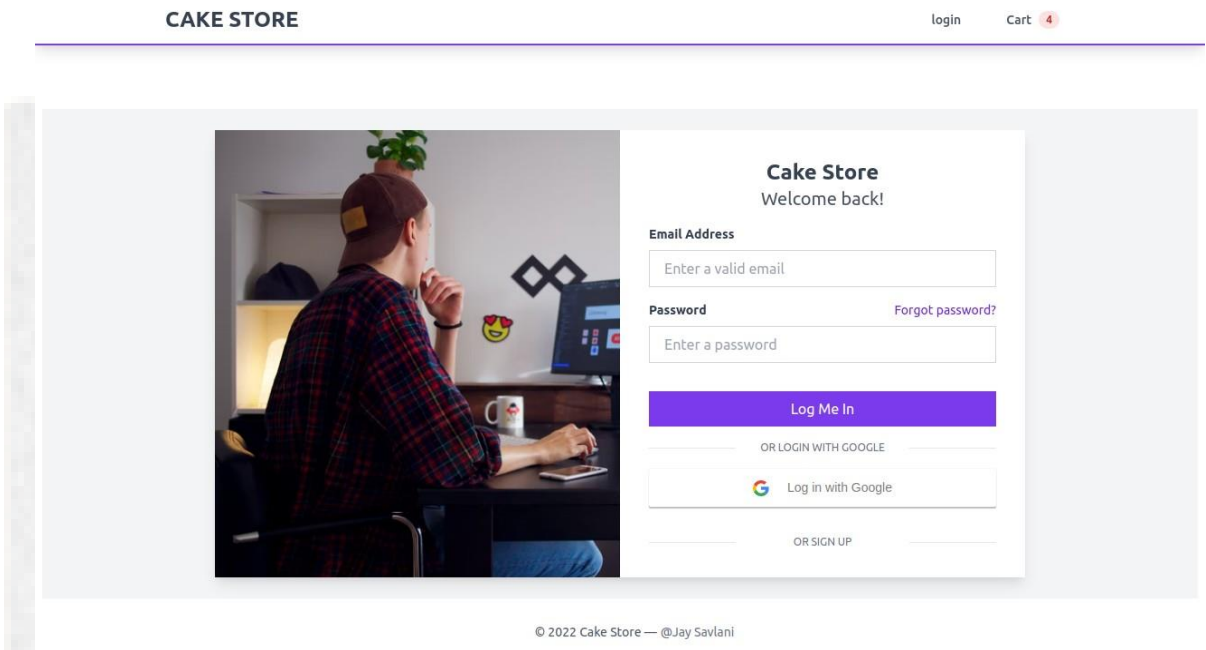


Figure 8.1.1 Login

- **Sign Up:**

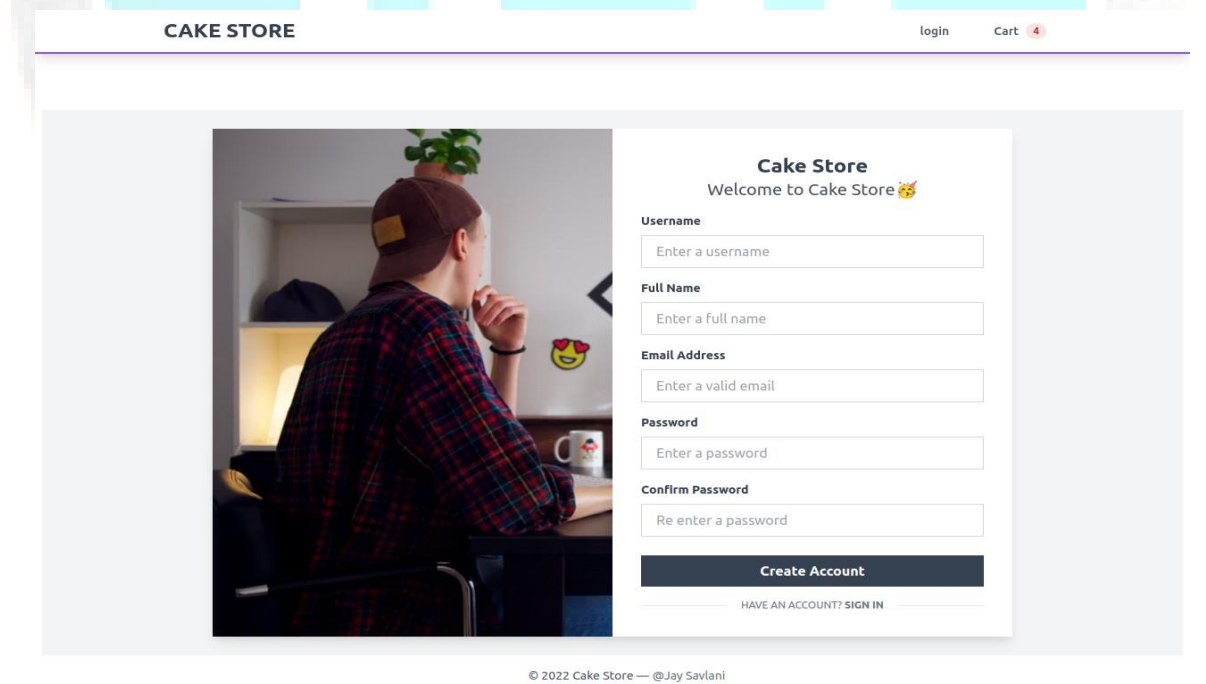


Figure 8.1.2 Sign Up

- **Welcome Message:**

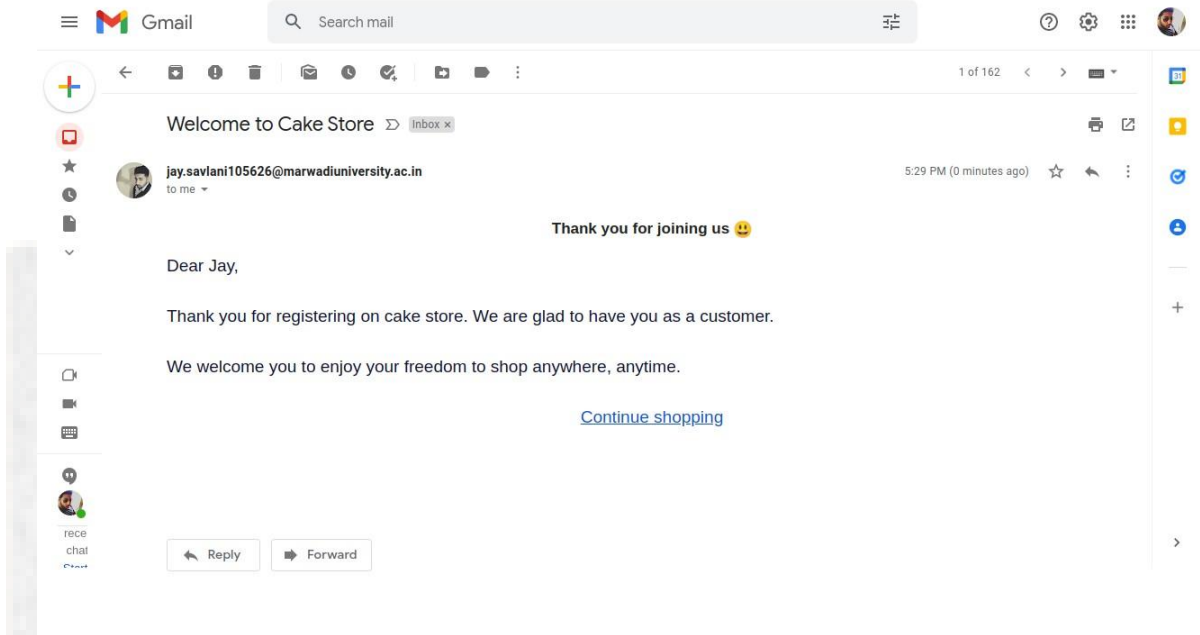


Figure 8.1.3 Welcome Message

- **Forgot Password:**

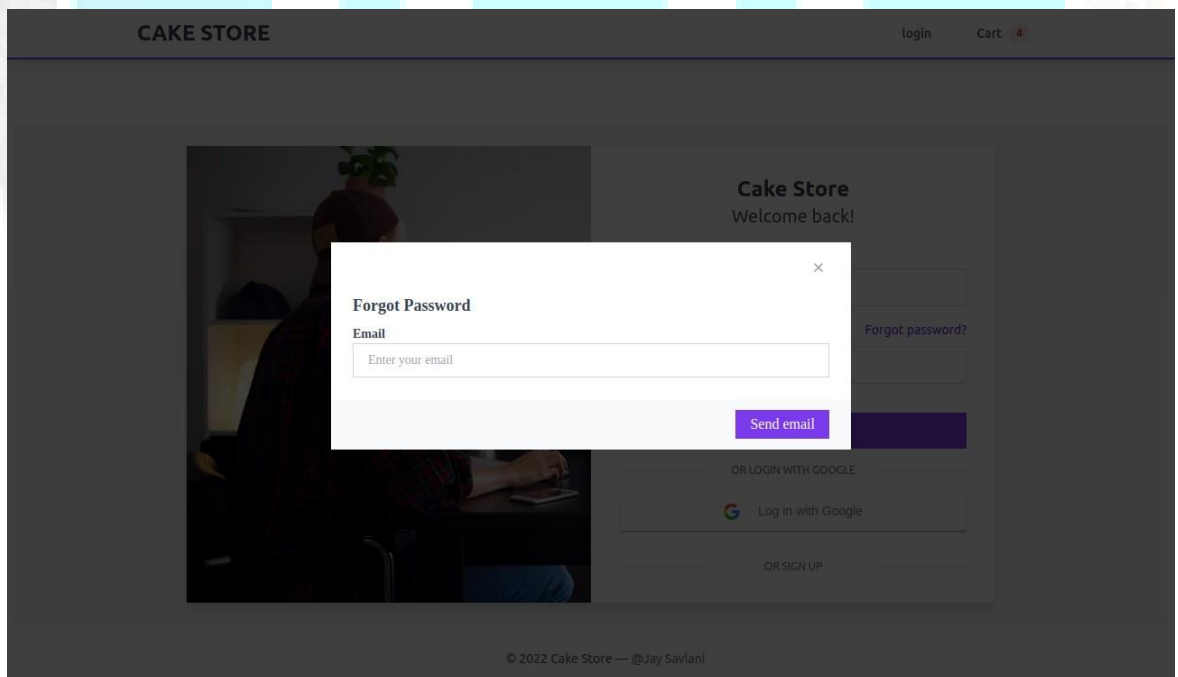


Figure 8.1.4 Forgot Password

- **Forgot Password Message:**

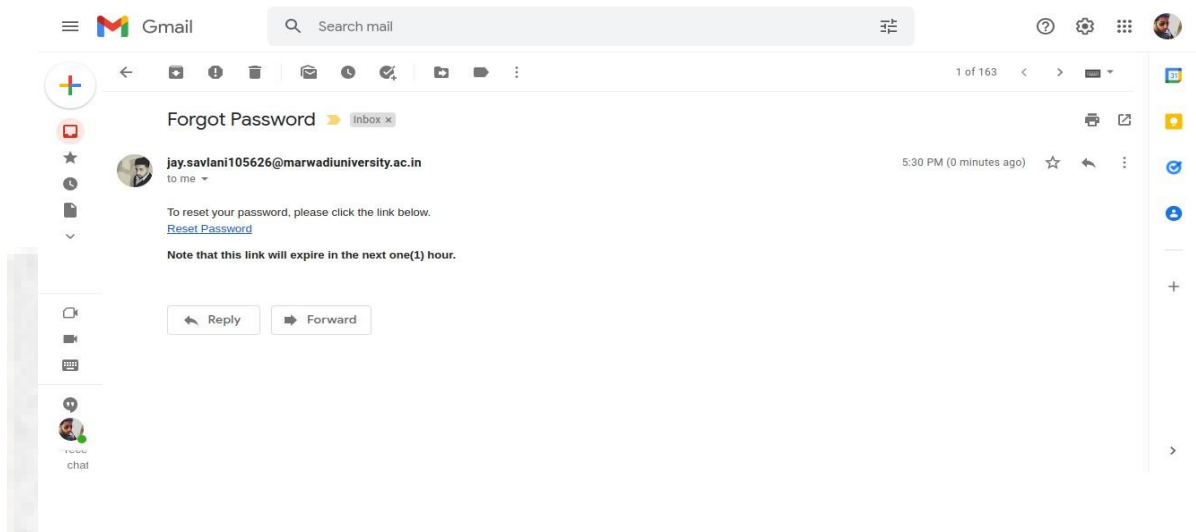
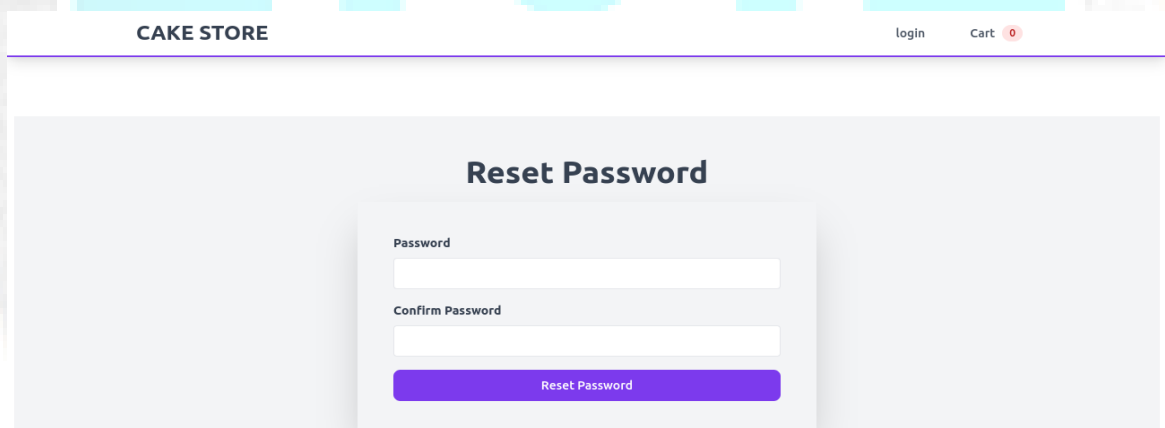


Figure 8.1.5 Forgot Password Message

- **Reset Password**



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Figure 8.1.6 Reset Password

● **Password Reset Success Message:**

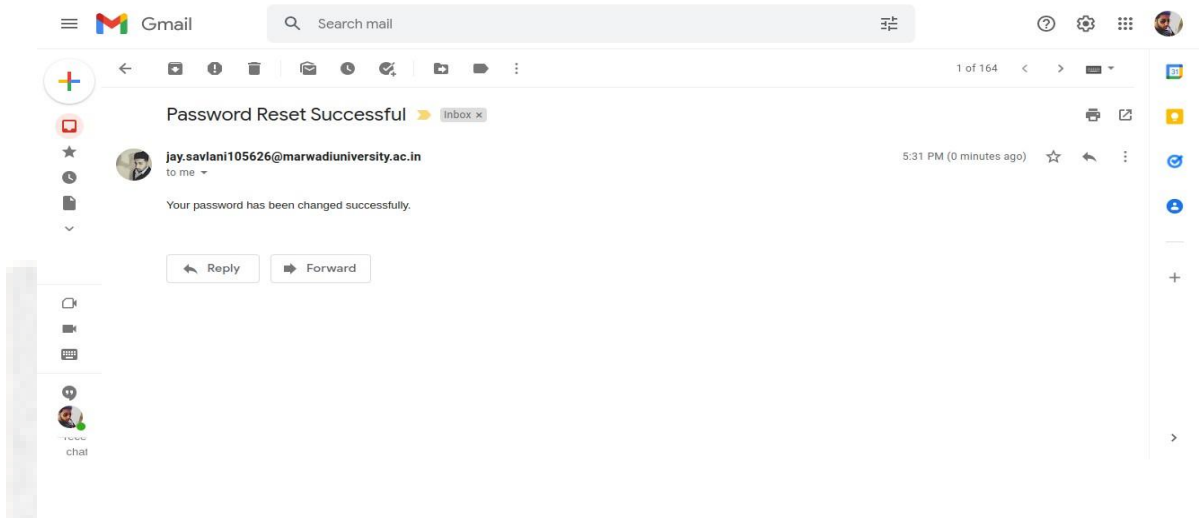


Figure 8.1.7 Password Reset Success Message

● Home:

CAKE STORE login Cart 4

Bakers make the world smell better Sort ▾



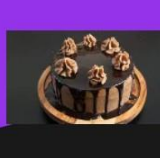



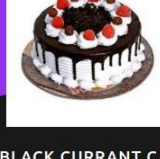
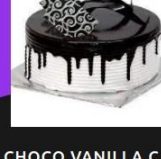

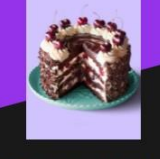
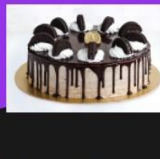

BY TYPES

- All Cakes
- Photo Cakes
- Designer Cakes
- Eggless Cakes
- Dry Cakes

PRICE RANGE

- Under ₹500
- ₹501 - ₹1000
- ₹1001 - ₹1500
- Over ₹1500

Clear Filters

 <p>KIWI CAKE ₹350.00</p>	 <p>BUTTERSCOTCH C... ₹350.00</p>	 <p>COFFEE CAKE ₹375.00</p>	 <p>CHOCO MARBLE C... ₹450.00</p>
 <p>STRAWBERRY CAKE ₹600.00</p>	 <p>GREEN APPLE CAKE ₹650.00</p>	 <p>BLACK CURRANT C... ₹700.00</p>	 <p>CHOCO VANILLA C... ₹700.00</p>
 <p>BLUEBERRY CAKE ₹750.00</p>	 <p>BLACK FOREST CAKE ₹850.00</p>	 <p>OREO CAKE ₹900.00</p>	 <p>STRAWBERRY ROS... ₹1,300.00</p>


SHOWING 1-12 OF 24 < 1 2 >

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Figure 8.1.8 Home

● **Cake Details:**

CAKE STORE
Cart 7 Account



Strawberry Cake

★★★★☆ 1 Reviews f t m

Description This cake starts with two delicious layers of a Vanilla Genoise that are soaked with a sugar syrup. Then it is filled with cream and fresh strawberries. The cake is frosted with a smooth coating of a stabilized whipped cream that contains pretty red flecks of strawberries. This cake is like a sophisticated version of a Strawberry Shortcake.

Quantity - 1 +

~~₹600.00~~ ₹540.00
Add to cart

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Figure 8.1.9 Cake Details

● **Profile:**

CAKE STORE
Cart 7 Account

Profile
Your personal information

Full name	JAY SAVLANI
Username	jaysavlani
Email address	jay.savlani105626@marwadiuniversity.ac.
Password	Reset password by email
Address	Vrundavan Appt, 3rd floor, 2-Jagnath Plot, Dr. Yagnik Road, Rajkot-360001
City	Rajkot
State	Gujarat
Country	India

Edit ✎

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Figure 8.1.10 Profile

● **Shopping Cart:**

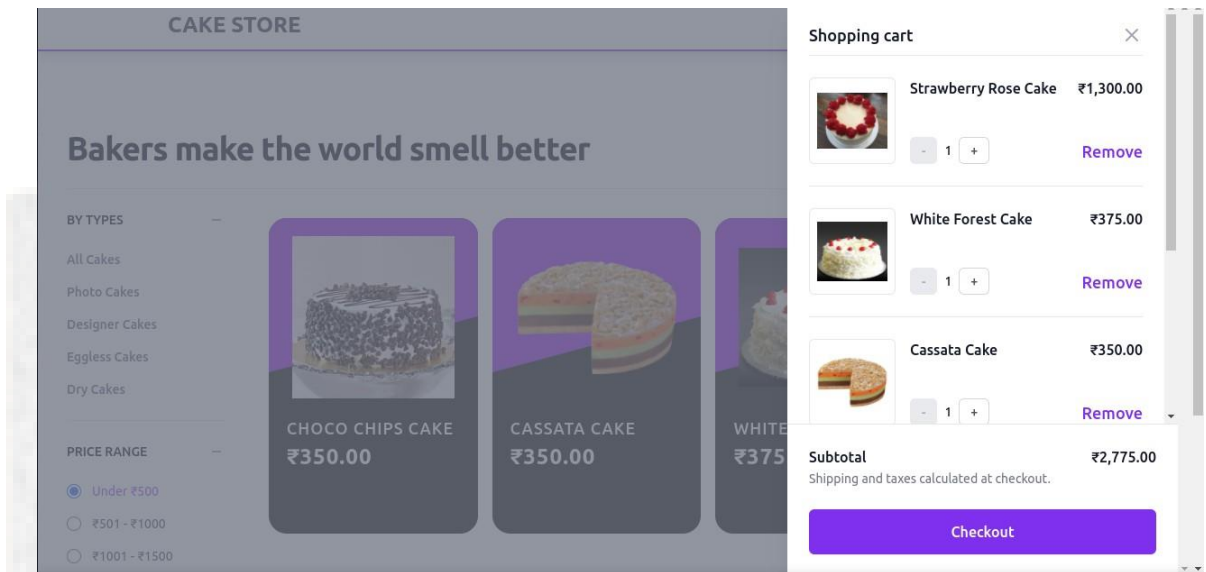







Figure 8.1.11 Shopping Cart


● **Checkout:**

CAKE STORE
Cart **7** Account

Customer's Cart

	Price ₹1,300.00	Qty 2	Total Price ₹2,600.00
	Price ₹750.00	Qty 1	Total Price ₹750.00
	Price ₹1,100.00	Qty 2	Total Price ₹2,200.00
	Price ₹750.00	Qty 1	Total Price ₹750.00
	Price ₹350.00	Qty 1	Total Price ₹350.00

Customer



JAY SAVLANI
3 Previous Orders

✉ jay.savlani105626@marwadiuniversity.ac.in

Default Shipping Address

Vrundavan Appt, 3rd floor, 2- Jagnath Plot, Dr. Yagnik Road, Rajkot-360001, Rajkot, Gujarat, India.

Current Shipping Address

Vrundavan Appt, 3rd floor, 2- Jagnath Plot, Dr. Yagnik Road, Rajkot-360001, Rajkot, Gujarat, India.

Pay with Stripe

Back
Pay ₹6,035.00

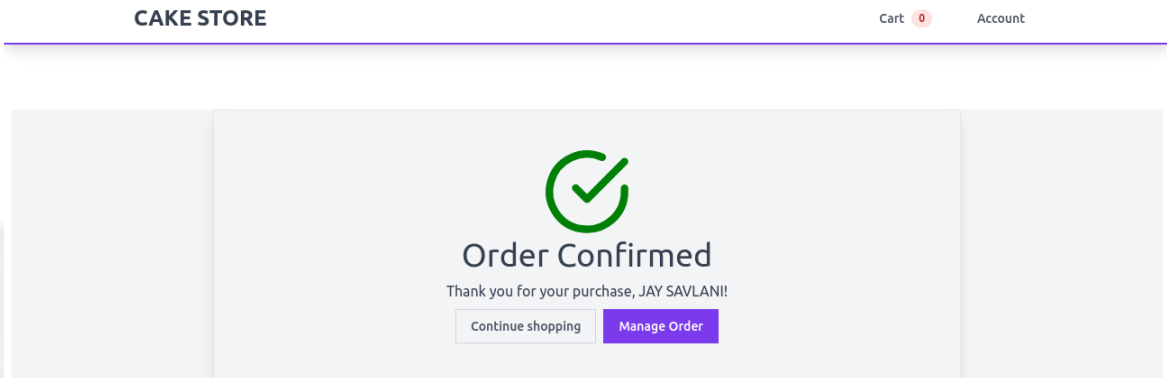
Summary

Subtotal	₹6,650.00
Discount	-₹931.00 (14%)
Shipping	₹50.00
Total	₹6,035.00

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Figure 8.1.12 Checkout

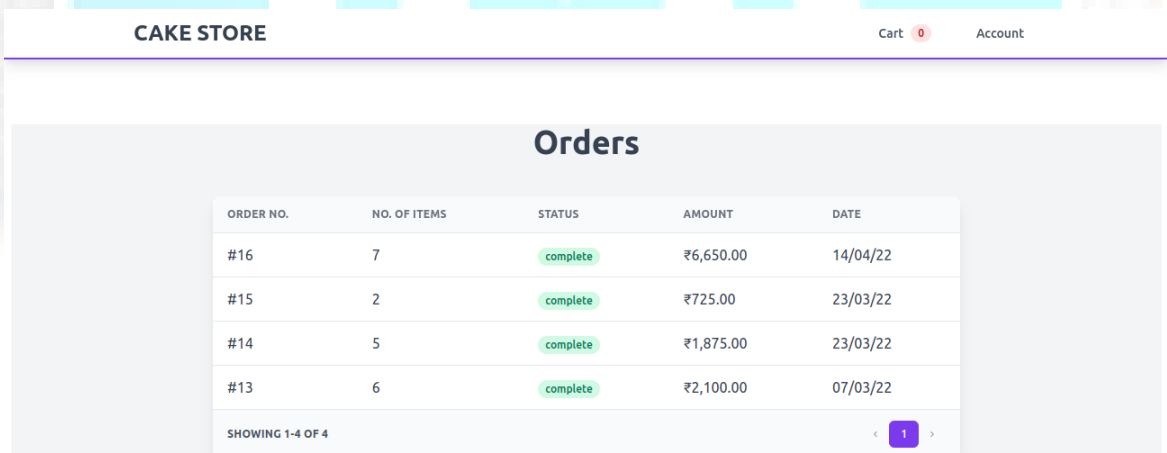
- **Order Success:**



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Figure 8.1.13 Order Success

- **Orders:**



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Figure 8.1.14 Orders

● **Order Details:**

CAKE STORE

Cart 0

Account

Order Details

Order no: #15
 2 items
 Status: complete
 Total Amount: ₹725.00
 Placed on: 23 Mar, 2022

Items in your order



Choco Vanilla Cake
 ₹700.00

Better Together Chocolate Vanilla Cake. Because sometimes you just want chocolate and vanilla. Now you don't have to choose! Soft and fluffy vanilla cake, sandwiched between two layers of soft and fluffy chocolate cake, and frosted with both chocolate and vanilla buttercream. Truly the best of both worlds!

Quantity: 1



Kiwi Cake
 ₹350.00

Kiwi cake is made with Kiwi crush whipped cream with layers of vanilla or chocolate. During Kiwi season you may have bits of freshly cut kiwi fruit layers on the coloured top. The health benefits of kiwi fruit which goes into making of this delectable cake makes it a favourite of health conscious people.

Quantity: 1

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Figure 8.1.15 Order Details

9. Limitation and Future Enhancements

There are a ton of elements and functionalities that can be incorporated in the proposed framework however the venture scope has been restricted to tirelessly determine the issues as recognized in the trouble spots above. The venture objective must be accomplished relating to the Time Constraint and Monetary limitation applied as per the characterized usefulness of the framework. Notwithstanding, highlights that are excluded from the framework can be considered as future enhancements.

9.1 Limitation

- Frauds in online shopping.
- Delay in the delivery.
- You can't touch and feel the product.
- You can't bargain.
- Lack of interaction.
- Returning the product.

9.2 Future Enhancement

- We will add a Google login/Signup system.
- We can give more advanced functionality for the Cake Store System including more facilities.
- We will have the stage on web-based servers to make it available around the world.
- Incorporate different burden balancers to circulate heaps of the framework.

The above-mentioned points are the enhancements that can be done to increase the applicability and usage of this project. Here we can maintain the records of

Customers and Cakes. Also, it can be seen that nowadays the players are versatile, i.e. so there is a scope for introducing a method to maintain the Cake Store System. Enhancements can be done to maintain all the Customers, Cakes, Bakers, Cake Type.



10. Conclusion

The **Cake Store** is designed to be very user-friendly and interactive so that the user cannot find any difficulty while browsing the website. Thereby the proposed website, which is an economically, technically, and operationally feasible system has overcome the deficiency that was present in the manual system.

Choosing the best eCommerce platform for ordering cakes is a tough task! This is since the adoption of web application technology has increased in leaps and bounds in the world.

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Date: 25/09/2021
Ahmedabad

Dear Kiran,

We are pleased to offer Kiran Tanwani ("Employee") a full-time position at Crest Data Systems Pvt Ltd ("Company" or "Crest Data Systems"). We strongly believe that our team is our biggest asset and that our success is directly dependent how we collectively perform together as a team. With that spirit we would like to make the offer below. Please do not hesitate to reach out to us if you have any further questions. We would like to request you to treat all the information in this offer letter as highly confidential and discuss the details only with the HR or your hiring manager.

1. Appointment

We are pleased to extend a joint internship plus full-time employment offer of appointment as a "Software Engineer" at Crest Data Systems. Your primary responsibilities shall include but not be limited to the following:

- a) Understand new technologies and programming languages that the Company works with.
- b) Complete necessary training provided by the company.
- c) Assist project team with Software Development, QA, Automation, CloudOps/SRE, and Support to deliver technology solutions in the field of Data Analytics, Cyber Security, ML/AI, DevOps, and Cloud for the company.
- d) Focus on solving customer requirements and perform multiple engineering roles as needed for the project.

The Company shall be at liberty to change the job description when a business necessity for the change arises without any prior intimation.

You agree, as a condition of employment, that you will execute the Company's '*Non-Disclosure and Confidentiality Undertaking*' Simultaneously with the execution of this letter.

2. Compensation and Benefits

During internship, your monthly total compensation will be Rs. 8,000/- (Rupees Eight Thousand). Your compensation will be paid monthly and will be subject to deduction of tax at source in accordance with regulations. Your compensation and benefits may be amended at the sole discretion of the Company.

Upon successful completion of the Internship, you are offered Full-time Employment at the Company with an annual compensation package of INR Rs. 700,000 (Rupees Seven Lakhs) inclusive of all the benefits, allowances, PF, and ESIC. Your compensation will be paid monthly and will be subject to deduction of tax at source in accordance with regulations.

3. Term of Employment

The internship will start from the date your college allows you to start the internship to the date the Company verifies the provisional degree certificate from your college. During the internship period, you are expected to work during regular business working hours (or your rotation shift hours as necessary for the business) and will be subject to the same company working hour policies as a regular employee. Upon verification of the provisional or final degree certificate by the Company, you will be converted to a Full-time employee at the Company.

You acknowledge that you will be under 18 months of service agreement with the Company, which would be applicable from the first day of internship to 18 months thereafter. In the event of your leaving, abandoning, or resigning the service of the Company in the breach of the terms of the agreement before expiry of the term would be quantified at INR Rs. 1,00,000/- (Rupees One Lac) or 1 month cost to company salary whichever is higher.

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4. Leaves

- a) During your association with the Company you will be entitled to benefits as provided by Company policy and will be subject to current Company policies or those introduced or amended from time to time. We currently offer:
 - (i) During the Internship period, you are allowed to take up to 1.75 days Paid Time Off (PTO) only for emergencies and study related reasons. Upon completion of internship, PTO leave balance (positive or negative) will be converted into cash compensation.
 - (ii) Upon being full-time Employee, you will be eligible for Paid Time Off (PTO) leave of 21 days per year accumulated at the rate of 1.75 days per paycheck (monthly). If you join or terminate employment in the mid-month then PTO will be pro-rated based on working days in the month.
 - (iii) Upon being full-time employee, PTO balance (positive or negative) will be converted into cash compensation at the end of financial year (March 31st) and PTO will be accumulated from scratch at the beginning of new financial year (April 1st).
 - (iv) Maternity leave will be provided based on prevalent law at the time of start of the maternity leave.
 - (v) Company-paid paternity leave of 5 working days from the birthday of the child. This leave can be taken anytime within 6 months of the child's birth.
 - (vi) We offer approximately 10 public holidays per year depending on your location/region of employment.
- b) You shall inform your immediate superior in writing, reasonably in advance, of your intention of taking your leaves and you shall obtain his prior approval. It is expected that leaves related to Study from the College are made known to the students in advance, so the same notice have to be provided to the Company so that they can plan training (for the Intern) and/or project plans accordingly.
- c) If you are unable to attend work due to illness or injury, you are required upon request to provide a medical certificate from a registered medical practitioner confirming the illness or injury and stating its probable duration. In the case of any illness exceeding the stated probable duration, you will provide a further medical certificate from a registered medical practitioner within [three (3)] days after the expiry of the previous medical certificate.
- d) You understand that taking any leaves during your notice period, may result in extension of the notice period.
- e) Any Intern or Employee found to be taking excessive leaves without a valid justification, that affects the training program or project deliverables of the Company may result in termination from the Company.

5. Working location and norms

Your working location will be First Floor Bhaskar House SG Road, Makarba Ahmedabad, Gujarat 380015. As part of your duties you may be required to travel outside the Company's premises. During your employment with the company you may also be transferred or deputed to any of the offices or locations of the Company or any of its affiliates or subsidiaries or group companies in India or abroad on the same or similar terms and conditions of employment.

- a) Regular office working hours for most employees are Monday through Friday from 10am to 7pm.
- b) For employees working for technical support, DevOps, SRE, CloudOps, Marketing, Sales, or Business Development, it is expected that your regular work hours may be in a shift of 9 hours in the morning / afternoon / evening / night and also in rotation across different shifts as required by business. Employees working in they night shift will have their working hours from 10pm to 7 am. These hours may shift slightly depending on the time zone in which the client is based or on the Daylight Savings Time. Employees working for technical support, DevOps, SRE, CloudOps may have rotational weekends and public holidays depending on project requirement.
- c) It is expected that you will be available for any customer meetings / engagements as and when necessary.
- d) In the event of travel, accommodation and travel will be provided as per the Company policy.
- e) During the COVID-19 pandemic you may be required to work from home, but as situation stabilizes, we may ask you and your colleagues to come to office in a phased manner.

6. Probation

Upon being a full-time employee, you will be on probation for a period of six (6) months from the date of joining. The company may at its sole discretion extend your probation period based on your performance or other factors as the Company may deem fit.

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7. Notice Period

- a) Your employment with the Company can be terminated by 60 (sixty) days' notice (notice period) in writing from either side regardless of whether you are performing internship or working as a permanent full-time (regardless of the probation period).
- b) The Company has exclusive right to accept the resignation and terminate your employment any time before the notice period at Company's discretion for any reason whatsoever.
- c) If you are relieved earlier then the employee shall not be entitled to getting paid from the day of termination.
- d) If you submit your resignation then you must serve the entire notice period if the Company requires you to stay through the duration.
- e) The company reserves the right to take legal action and report to the concerned authorities and industry bodies in case the employee leaves without serving the notice period.

8. Termination

- a) In the event that the Intern does not complete all the formalities of the Internship, the Company reserves the right to cancel (or extend) his/her full-time employment and/or shall not be liable to provide an Internship completion Certificate to the Intern and will notify his/her college about the same.
- b) However, in the event of gross indiscipline, violation of any company policies, willful neglect of duties, breach of trust or any discrepancy or untrue information found in the Employee's application, the Company has the discretion to terminate your services with such notice as it deems fit and without any notice or notice pay.
- c) Upon the termination of your employment for any reason by either party, or upon the effective notice of termination of your employment by either party, the Company shall have the right to relieve you from the performance of any and all duties of the position upon the continued payment of your salary and compensation, as then in effect, for the duration of the notice period. During such notice period, you may be required not to attend for work, at the Company's absolute discretion. However, you will not take up any alternate employment until the expiration of such notice period.
- d) The termination of your employment howsoever arising shall not affect such of the terms hereof as are expressed to operate or have effect thereafter and shall be without prejudice to any right of action already accrued to the Company in respect of any breach or default by you.
- e) If your employment is terminated for any reason:
 - (i) the Company may set-off amounts you owe the Company against any amounts the Company owes you at the date of termination except for amounts the Company is by law not entitled to set-off;
 - (ii) you must return all the Company's property to the Company on termination including all written or machine-readable material, software, laptop, mobiles, computers, credit cards, keys and vehicles, etc; and you must not record or retain any confidential information of the Company which is marked as such or which by its nature is deemed as confidential whether so informed by the Company at the time of giving or not, in any form after termination. Upon request of the Company, you will return or destroy or have destroyed all correspondence, specifications, books, documents, market data, cost data, drawings, effects or records etc. or any other material belonging to the Company or relating to its business, including in its electronic form and shall not retain or make copies of these items. You will provide a certificate to the Company that such materials have been destroyed or returned, as the case may be.
 - (iii) The Experience letter and/or relieving letter will be provided once amount you owe to the company is fully received.
- f) The company reserves the right to take legal action and report to the concerned authorities and industry bodies in case the employee leaves without completing his/her termination formalities.

9. Increment in Salary and/or Grade

For all permanent employees, your salary and/or grade will be revised annually in April or October cycle depending on the date of joining. Employees who have joined in the months of January to June will have their annual performance and increment appraisal in April cycle and employees who join in the months of July to December will have their annual performance and increment appraisal in October cycle. Employees must have completed their probation period to be eligible for salary/grade review. Interns are not eligible for increment in Salary and/or Grade. Interns must be converted to permanent employees and their increment cycle will start from the day they are converted to permanent employees.

This review will be based on the performance management norms of the Company and your performance in a given assessment period and on such effective date as applicable to employees in your category. Your appraisal depends on your efficiency, hard work, regularity in attendance, sincerity, good conduct, supervisor feedback, customer feedback, Company performance, and such other relevant factors as adjudged by the management. The

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compensation payable to you by the Company is unique and personal and any comparison of the same with those of others will be of no relevance. It is against the Company policy to share your salary or increment information with anyone in the Company other than your management, HR, and the Finance team.

10. Non-Solicitation

Non-solicitation of clients. you agree for a period of 2 Years from the date of relieving of my employment with Crest Data Systems to not directly or indirectly solicit competitive business from any client or customer of the organization that was contacted, solicited, or served by you or about which you received confidential information while you were employed by Crest Data Systems, nor for the same period of time, will I perform services or accept any business, competitive with that of Crest Data Systems, directly or indirectly from any of the clients or customers of Crest Data Systems, which involves you performing similar functions or acting in a similar capacity as when employed with Crest Data Systems.

Employment with clients. you agree for a period of 2 Years from the date of relieving of my employment with Crest Data Systems to not perform services, employment, or accept any business, that competes with that of Crest Data Systems directly or indirectly from any of the clients or customers of Crest Data Systems, which involves you performing similar functions or acting in a similar capacity as when employed with Crest Data Systems.

Non-solicitation of other employees. you agree so long as employed by Crest Data Systems and for a period of 2 Years after leaving for any reason whatsoever, not to directly or indirectly recruit, solicit, or otherwise induce or attempt to induce any employee of Crest Data Systems to terminate his or her employment with the Company or otherwise to act contrary to the interests of Crest Data Systems.

In the event of breach of any of the above clauses, the Company shall have a further and additional right to take any legal action and pursue the higher of the Liquidated Damages as highlighted in the Employee Non-Disclosure Agreement (signed upon joining the Company) or Employee Non-Solicitation Agreement (signed upon leaving the Company).

You undertake to execute a separate "Employee Non Solicitation Agreement" separately at the time of leaving the company. You also undertake to execute the "Employee Non-Disclosure Agreement" at the time of appointment and also to execute an additional "Employee Non Solicitation Agreement" with modification in future if need so arises and if company thinks deem fit to modify the terms of such "Employee Non-Disclosure Agreement" that the employee also agreed to sign.

11. Expectations

In making this Offer of Appointment, we expect that:

- a) You devote your full time and attention in carrying out work activities at the Company and will not engage in or do any other IT business or render any professional service either on a full time or part time basis as an employee or as a contractor/consultant. You will also not engage directly or indirectly in any other profitable business connected with the dealings of the Company in any way.
- b) You will keep your work strictly confidential and not divulge or disclose any information in any form, either during the employment or after, to anyone not employed by the Company. He/she will also execute and adhere to a Confidentiality Undertaking upon joining the company.
- c) You can maintain a state of medical, physical, and mental fitness and ensure annual medical checkups. You may be required to submit a medical fitness certificate.
- d) You have accurately represented the in your application and/or resume. You will authorize the Company to verify educational and employment records, conduct and any other background checks prior to joining the Company or anytime thereafter.

If any of the above expectations are not met, your employment may be terminated forthwith and without any notice period and without any liability to the Company.

12. Protection of Interest

If you conceive or make any new or advanced methods of improving designing / processes / systems or all improvements in relation to the operations of the Company, such developments shall be fully and immediately communicated to the Company and shall be and remain the sole and exclusive right/property of the Company in perpetuity. If required by the Company, you shall execute separate documents or agreements in relation to such

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matters, conferring such rights on the Company. The salary payable to you hereunder is adequate compensation for such assignment and hence, shall not be entitled to any additional payment in this regard.

13. Past records

If any declaration given or information furnished by you to the Company proves to be false or if you are found to have willfully suppressed any material information, in such cases, you shall be liable to removal from employment, without any notice and without any compensation.

14. Documents

Following documents and approvals are contingent upon joining Crest Data Systems as a full-time/part-time employee or intern:

- a) Upon joining the Company, you are required to execute a Non-Disclosure Agreement which along with this offer of appointment and other such paperwork, will govern the terms of your employment with the Company.
- b) You will be required to provide verifying certificates/documents for photo identification, PAN card copy, educational qualifications (10th and 12th standard certifications, and Diploma/Bachelors/Master of Engineering degree certification and/or coursework), previous employment details relieving and/or experience letter, and three recent pay slips if any.
- c) All employees joining Crest Data Systems are required to sign the service agreement including internship with the company from internship start date.
- d) Employees whose International Visa / Work Permit is being sponsored by Crest Data Systems or its affiliates to undertake onsite project or training internationally clients will have to sign a one-year bond/service agreement with the company.
- e) If an employee resigns during the bond period, he/she will have to bear the cost of the agreement.
- f) In case of the event of the employee leaving the company (voluntarily or involuntary), the employee agrees to sign Non-Solicitation Agreement to protect the Company resources, business, customers, and partners against solicitation.

Agreeing to the above is mandatory and no exceptions will be made. If you have any concerns regarding any of the above, please talk to our HR / management prior to accepting the offer.

15. Miscellaneous Terms and Conditions

- a) You hereby agree and undertake to immediately intimate the Company of any change in the information provided.
- b) By signing below, you are agreeing to have read and understood each and every provision of this Letter of Appointment and that in consideration of the Company offering employment, voluntarily and unconditionally agree to abide by its terms and conditions of employment and any such directions or instructions as may be issued by the Company from time to time in discharge of your obligations as an employee of the Company.
- c) If any provision of this letter shall be prohibited by or adjudicated by a court to be unlawful, void or unenforceable such provision shall to the extent required be severed from this letter and rendered ineffective as far as possible without modifying the remaining provisions of this letter and shall not in any way affect any other provisions or the validity or enforcement of this letter.
- d) The Company will have the right to transfer and assign this contract of employment and all covenants and agreements herein will inure to the benefit of and be enforceable by such successors and assigns. This contract of employment is personal to you and you will not be entitled to transfer or assign it in whole or in part.

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16. Governing law and jurisdiction


This Letter of Appointment shall be governed by Indian law. The courts at Ahmedabad only shall have exclusive jurisdiction in the event of any dispute arising between you and the Company in respect of or under this Letter of Appointment or in any matter concerning your employment with the Company. You hereby agree to unconditionally and unequivocally submit to such exclusive jurisdiction of the courts at Ahmedabad as envisaged hereinabove.

Please confirm that the above terms and conditions are acceptable to you and that you accept this appointment by signing this Letter of Appointment.

We look forward to having you be part of our team and grow with us.

Congratulations and welcome to Crest Data Systems!

Yours sincerely,

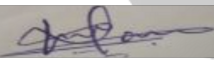
Signature: 

Date: 25/09/2021

Name: Neha Shah
Director, Crest Data Systems Pvt Ltd

On signing and acceptance of this Letter of Appointment, you have consented to the Company processing, both electronically and manually any appropriate data it may gather during your employment. This may include sensitive personal data, such as medical information, etc.

I agree and accept employment with the Company based on the terms and conditions mentioned in this Letter of Appointment, which have been read and understood by me.

Signature: 

Date: 25/09/2021

Name: Kiran Tanwani

(I have signed this agreement voluntarily, without any coercion and undue pressure)

EMPLOYEE NON-DISCLOSURE AGREEMENT

1. **General.** As an employee of CREST DATA SYSTEMS PVT LTD (“Crest Data Systems” or “Company”), a company incorporated in First Floor Bhaskar House SG Road, Makarba Ahmedabad, Gujarat 380015, under the Companies Act 1956 and in consideration of the compensation now and hereafter paid to me, I will devote my best efforts to furthering the best interests of Crest Data Systems. During my employment, I will not engage in activity that:
 - a. conflicts with Crest Data Systems’ business interests, including without limitation, any business activities not contemplated by this agreement,
 - b. occupies my attention so as to interfere with the proper and efficient performance of my duties at Crest Data Systems, or
 - c. interferes with the independent exercise of my judgment in the best interests of Crest Data Systems.

As used herein, Crest Data Systems business means the development, QA, Automation, engineering, marketing, technology operations, and support of software and services for business and professional use including operating systems, application programs, Internet related websites or e-commerce solutions as well as books and hardware for the microcomputer and the Internet marketplace.

2. **Recognition of Absolute ownership.** That I do hereby recognize and admit that Crest Data Systems is the absolute, unrestricted and exclusive owner of the confidential or proprietary technical, financial, marketing, manufacturing, distribution, or other technical or business information or trade secrets of Crest Data Systems, including without limitation, concepts, techniques, processes, methods, systems, designs, clients, cost data, computer programs, formulae, development or experimental work, work in progress, customers and suppliers as well as software for business and professional use including operating systems, application programs, Internet related websites or e-commerce solutions as well as books and hardware for the microcomputer and the Internet marketplace used by me in the course of my employment with Crest Data Systems.

I agree that I shall not in any manner whatsoever, represent and/or claim that I have any interest by way of ownership, assignment or otherwise in the same.

In this agreement, all confidential and/or proprietary information belonging to and/or in possession of Crest Data Systems, which is received, accessed, and/or used by me during the course of my employment with Crest Data Systems, shall include without limitation, such information received from Crest Data Systems, its customers and/or any entity in which Crest Data Systems holds or controls more than 50% of the equity stock thereof and/or is entitled to vote for the election of directors.

3. **Non-Disclosure.** At all times, during my employment and thereafter, I will not disclose to anyone outside Crest Data Systems nor use for any purpose other than my work for Crest Data Systems:
 - a. any confidential or proprietary technical, financial, marketing, manufacturing, distribution, personal data that you may have access to as part of your project with Crest clients or other technical or business information or trade secrets of Crest Data Systems, including without limitation, concepts, techniques, processes, methods, systems, designs, circuits, cost data, computer, programs, formulae, development or experimental work, work-in-progress, customers and suppliers,
 - b. any information Crest Data Systems has received from others which Crest Data Systems is obligated to treat as confidential or proprietary or
 - c. any confidential or proprietary information which is circulated within Crest Data Systems via its internal electronic mail system, intranet or otherwise.

I will also not disclose any confidential or proprietary information to anyone inside Crest Data Systems except on a “need-to-know” basis. If I have any questions as to what comprises such confidential or proprietary information or trade secrets, as to whom, if anyone inside Crest Data Systems, it may be disclosed, I will consult with my manager and Human Resources (HR) at Crest Data Systems.

4. **Assignment of inventions.** I hereby assign exclusively to Crest Data Systems all my right, title and interest in and to any all inventions, discoveries, designs, developments, improvements, copyrightable material, and trade secrets (collectively herein “Inventions”) that I solely or jointly may conceive, write, encode, develop,

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test, or reduce to practice during the period of time I am in the employment of Crest Data Systems. I will make prompt and full disclosure to Crest Data Systems of any inventions, and if for any reason the assignment pursuant to this clause is not effective, will hold all such inventions in trust for the sole benefit of Crest Data Systems.

I hereby waive and quit claim to Crest Data Systems, any and all claims of any nature whatsoever that I now or hereafter may have for infringement of any patent resulting from any patent applications for any inventions so assigned to Crest Data Systems.

My obligation to assign shall not apply to any invention about which I can prove that:

- a. it was developed entirely on my own time; and
- b. no equipment, supplies, facilities, services or trade secret of Crest Data Systems was used in its development; and
- c. it does not relate
 - i. directly to the business of Crest Data Systems or
 - ii. to the actual or demonstrably anticipated research or development of Crest Data Systems; and
- d. it does not result from any work performed by me for Crest Data Systems.

5. **Excluded and Licensed inventions.** I have attached hereto, a list describing all inventions – belonging to me and made by me prior to my employment with Crest Data Systems that I wish to have excluded from this agreement. If not, such list is attached, I represent that there are no such inventions. If in the course of my employment at Crest Data Systems, I use in or incorporate into a Crest Data Systems product, program, process or machine, and invention owned by me or which I have an interest, Crest Data Systems is hereby granted and shall have an exclusive royalty-free, irrevocable, worldwide license to make, have made, use and sell that invention without restriction as to the extent of my ownership or interest.
6. **Application for Copyright and Patents.** I will execute any proper oath or verify any proper document in connection with carrying out the terms of this agreement. If, because of my mental or physical incapacity or for any other reason whatsoever, Crest Data Systems is unable to secure my signature to apply for or to pursue any application for any Indian or foreign patent or copyright covering inventions assigned to Crest Data Systems as stated above, I hereby irrevocably designate and appoint Crest Data Systems and its duly authorized officers and agents as my agent and attorney in fact, to act for me and in my behalf and stead, to execute and file any prosecution and issuance of Indian and foreign patents and copyrights thereon with the same legal force and effect as if executed by me,. I will testify at Crest Data Systems request and expense in any interference, litigation or other legal proceeding that may arise during or after my employment.
7. **Third party information.** I recognize that Crest Data Systems has received and will receive confidential or proprietary information from its customers as well as third parties subject to a duty on Crest Data Systems part to maintain the confidentiality of such information and to use it only for certain limited purpose. During the term of my employment and thereafter, I will not disclose such confidential or proprietary information to anyone except as necessary in carrying out my work in Crest Data Systems and consistent with Crest Data Systems agreement with such customers or third party. I will not use such information for the benefit of anyone other than Crest Data Systems or such third party, or in any manner inconsistent with any agreement between Crest Data Systems and such third party of which I am made aware.
8. **Company Asset Usage Policy including Company issued Laptops:**
 - a. You understand that you are solely responsible for the Company assets whilst in your possession.
 - b. You shall use the company assets solely for Company-related purpose.
 - c. The Company's IT and HR team may monitor the Company assets.
 - d. You shall keep the Company assets in good working order and will notify IT Team in case of any defect or malfunction during use.
 - e. You shall not install and / or download any unauthorised software and / or applications on Company asset.
 - f. You shall not allow the Company asset to be used by an unknown or unauthorized person. You shall assume full responsibility for the actions of others while using the laptop.
 - g. If the laptop is lost, stolen or damaged, the incident must be reported to the IT and HR team and your direct manager immediately.

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- h. If the lost, stolen, or damaged laptop and / or accessories is determined to be caused by negligence or intentional misuse, you shall assume full financial responsibility for repair costs or fair market value of the Company assets.
- i. You shall abide by the Company's Information Security and Data Usage policies and sign the Information Security and Data Usage Policy Acknowledgment Form to adhere to Company's policies upon joining.

You are aware that any breach of these policies may render you liable to a strict disciplinary action.

9. **Prior Employer Information.** During my employment at Crest Data Systems, I will not use improperly or disclose any confidential or proprietary information or trade secrets of my former or current employers, principals, partners, co-ventures, clients, customers or suppliers of the vendors or customers of such persons or entities or their vendor or customers and I will not bring onto the premises of Crest Data Systems, any unpublished document or any property belonging to any such persons or entities or their vendors or customers unless such persons or entities have given their consent. I will not violate any non-disclosure or proprietary rights agreement I might have signed in connection with any such person or entity.
10. **Presumption of breach.** In the event of the possession, access and or use of the confidential or proprietary technical, financial, marketing, manufacturing, distribution or other technical or business information or trade secrets of Crest Data Systems, including without limitation, concepts, technique's processes, methods, system's, designs, clients, cost data, computer programs, formulae, development or experimental work, work-in-progress, customers and suppliers as well as software for business and professional use, application programs, internet websites, e-commerce solutions, books, hardware and information for the microcomputer and internet marketplace by any other third party with whom I may have a nexus, it shall be presumed, unless proved to the contrary, that such information has so come to the possession of the third party on account of breach of this agreement by me.
11. **Term of employment.** I acknowledge that I will be under 18 months of service agreement with Crest Data Systems Pvt. Ltd., which would be applicable from the first day of internship to 18 months thereafter. In the event of the employee leaving, abandoning, or resigning the service of the company in the breach of the terms of the agreement before expiry of the term would be quantified at INR Rs. 1,00,000/- (Rupees One Lac) or 1 month cost to company salary whichever is higher. I also acknowledge that my employment will be of indefinite duration and that either Crest Data Systems or I will be free to terminate this employment relationship at will and at any time with or without cause and in accordance with the Employment Agreement signed by me with Crest Data Systems on the day of joining. I also acknowledge that any representations to the contrary are unauthorized and void, unless contained in the said employment agreement signed by an officer of Crest Data Systems.
12. **Return of materials.** At the time I leave the employment of Crest Data Systems, I will return to Crest Data Systems all papers, drawings, notes, memoranda, manuals, specifications, designs, devices, documents, diskettes, CD's, DVD's. Tapes, DAT Drives and any other material on any media containing or disclosing any confidential or proprietary technical or business information. I will also return any keys, pass cards, ID cards or other property belonging to Crest Data Systems.
13. **Non-solicitation.** While employed at Crest Data Systems and for a period of 2 years from the termination of my employment, I will not induce or attempt to influence directly or indirectly, any employee at Crest Data Systems to terminate his employment with Crest Data Systems or to work for me or any other person or entity.
- a. **Non-solicitation of clients.** I agree for a period of 2 Years from the date of relieving of my employment with Crest Data Systems to not directly or indirectly solicit competitive business from any client or customer of the organization that was contacted, solicited, or served by me or about which I received confidential information while I was employed by Crest Data Systems, nor for the same period of time, will I perform services or accept any business, competitive with that of Crest Data Systems, directly or indirectly from any of the clients or customers of Crest Data Systems, which involves me performing similar functions or acting in a similar capacity as when employed with Crest Data Systems.
 - b. **Employment with clients.** I agree for a period of 2 Years from the date of relieving of my employment with Crest Data Systems to not perform services, employment, or accept any business, that competes with that of Crest Data Systems directly or indirectly from any of the clients or customers of Crest Data

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Systems, which involves me performing similar functions or acting in a similar capacity as when employed with Crest Data Systems.

- c. Non-solicitation of other employees. I agree so long as employed by Crest Data Systems and for a period of 2 Years after leaving for any reason whatsoever, not to directly or indirectly recruit, solicit, or otherwise induce or attempt to induce any employee of Crest Data Systems to terminate his or her employment with the Company or otherwise to act contrary to the interests of Crest Data Systems.
 - d. Liquidated Damages. I, unconditionally, without any protest and demur, agree to pay sum of Rs. 30,00,000/- (Rupees Thirty lacs Only) as a liquidated damages, to Crest Data Systems, in case of breach of the clause no. 13a, 13b, or 13c of this agreement on my part. The figure of liquidated damages is arrived at mutually and shall not have any bearing whether actual damages is caused to the tune of Rs. 30,00,000/- or not. I further agree that this clause shall not preclude the Crest Data Systems from recovering the further actual damages, if the same exceeds an amount of Rs. 30,00,000/-. The figure arrived by the Crest Data Systems with respect to the damages will be final and binding and I shall have no right to dispute the same.
 - e. I further agree that crest data system has absolute and unconditional right to revise the figure of the liquidated damages. It is agreed between the parties that Crest Data Systems will revise the liquidated damages every year and the same shall be posted in Company's Employee handbook. The revised figure so arrived by the Crest Data Systems is binding to me. I further unconditionally agree no to protest and contest the said revised figure by recourse to Law or otherwise.
14. **Personal property.** I agree that Crest Data Systems will not be responsible for loss, disappearance, or damage to personal property on Crest Data Systems premises, or if applicable, on residential premises subsidized by Crest Data Systems (including apartments or temporary housing). I hereby release, discharge and hold Crest Data Systems harmless from any and all claims relating to loss of, disappearance, or damage to such personal property.
15. **Equitable relief.** I acknowledge that any violation by me under this agreement, and/or any obligation of like nature, will cause irreparable injury to Crest Data Systems, and Crest Data Systems shall be entitled to extraordinary relief in any court in India, including, but not limited to, temporary restraining orders, preliminary injunctions, and permanent injunctions, without the necessity of posting bond or security.
16. **Attorney fees.** If court proceedings are required to enforce any provision of this agreement, the prevailing party shall be entitled to an award of reasonable and necessary expenses of litigation, including reasonable attorney fees.
17. **Entire Agreement.** I agree that this agreement shall be governed for all purposes by the laws of India. If any provision of this agreement shall be declared excessively broad, it shall be construed so as to afford Crest Data Systems the maximum protection permissible by law. If any provision of this agreement is void or is so declared, such provision shall be severed from this agreement, which shall otherwise remain in full force and effect. This agreement sets forth the entire agreement of the parties as to the subject matter hereof and any representations, promises, or conditions in connection therewith not in writing and signed by both parties shall not be binding upon either party, the terms and conditions of this agreement shall survive termination of my employment.

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The Courts of Ahmedabad alone shall have exclusive jurisdiction in case of dispute with respect to interpretation and implementation of the clauses of this agreement.

HAVING READ AND FULLY UNDERSTOOD THIS AGREEMENT, I have signed my name dated below:



Neha Shah
Director, Crest Data Systems Pvt Ltd



EMPLOYEE: Kiran Tanwani
(I have signed this agreement voluntarily, without any coercion and undue pressure)



EMPLOYMENT AGREEMENT

This Employee Agreement (hereinafter referred to as the Agreement) is entered on 03/01/2022 between Kiran Tanwani residing at 5, Sindhi Society, Tadvadi, Rander Road, Surat-39500

- (hereinafter called as the Employee, which expression shall, unless it be repugnant to the context or meaning thereof, be deemed to mean and include, his heirs and execute); and

Crest Data Systems Pvt Ltd, having its registered office at **First Floor Bhaskar House SG Road, Makarba Ahmedabad, Gujarat 380015** (hereinafter called as "Company" which expression shall include its affiliated and group companies, subsidiary or holding companies under the same management, successors and assigns)

The Company is in the Information Technology and software development industry; and

The Employee has approached the Company for employment; and

The parties recognize that the Employee, though qualified, does not possess any substantial practical exposure or knowledge base specific to the Information Technology and software development industry, consequently necessitating the undertaking of sizable and expensive training, for a considerable period, before the academic qualifications of the employee can be upgraded to the skill levels prevalent and imperative in the competitive industrial scenario, and made useful and adopted for the business of the Company, during which training period the Employee would not be in a position to undertake revenue generating work for the Company; and

WHEREAS The Company has heavily invested in establishing and maintaining relevant infrastructure for conducting courses to impart training to its employees who seek employment, thereby devoting its time, effort and money to train and upgrade the skills of the Employee; and

WHEREAS the Company is agreeable to offer training to the Employee, at the Company's costs, and suffer retention of the Employee during the training / internship / probation period without being in a position to utilize the Employee's services for any revenue generation during such period, provided the Employee offers the necessary comforts, assurance and promises to the Company, in terms more elaborately dealt with hereinafter; and

WHEREAS the Employee is keen to take up employment with the Company and avail of such necessary training and skill upgradation, in consideration of offering the comforts, assurances and promises expected by the Company.

NOW THEREFORE THE PARTIES AGREE AS FOLLOWS:

1. Scope

1.1 This agreement is intended to cover, *inter alia*, the commitment expected from the Employee, the treatment of Proprietary information of the Company which may come in the hands of the Employee, the dealing of issues arising from any Inventions or any Intellectual Property Rights coming into existence during the course of the employment of the Employee with the Company or within the specified term thereafter, the cooperation expected from the employee in perfecting the rights of the Company to all Inventions and Intellectual Property Rights, the training to be provided by the Company to the Employee and the obligations and covenants of the Employee concerning the requirement to serve the Company for the stipulated period and not serve any other employer, during such specific period and for consequential provisions of relief's and remedies. This agreement does not propose to address the specific terms of employment of the Employee, the pay scale, etc. which is the subject matter of a separate appointment letter issued by the Company, which appointment letter (the Appointment Letter) however, shall be subject to this agreement and this agreement and the appointment letter shall together, constitute the overall terms of employment of the Employee.

2. Term of employment.

The term of employment of the Employee with the Company shall, initially, be a period of **18 months** from the first day of internship to 18 months thereafter. The rights and obligations of the parties and the covenants on behalf of the Employee shall nonetheless continue beyond the Term, in case where the Employee's employment with the Company extends beyond the Term, without the necessity of any modification to this agreement.

The Company may consider granting of any special benefits / increments / promotions / ESOP / bonus to the Employee. At such a stage, the Company may wish to extend the Term, in which case the Company may do so by issuing appropriate communication in this regard, indicating the period (in years) by which the Term of the Employee stands extended. The parties agree and acknowledge that upon such extension, this agreement will continue to govern the rights and obligations of the parties for such extended Term, without any necessity of amendment to this agreement.

3. Proprietary Information.

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The Employee acknowledges that his employment creates a relationship of confidence and trust between the Company and the Employee with respect to any information:

Applicable to the business of the Company; or

Applicable to the business of any client or customer of the Company, which may be made known to the Employee by the Company or by any client or customer of the Company or learned by the Employee in such context during the period of his employment.

The parties also foresee that the Employee may discover or create Intellectual Property in the course of his employment and agree that in this respect the Employee has a special obligation to further the interest of the Company.

All such information has commercial value in the business in which Company is engaged and is hereinafter called "Proprietary Information." By way of illustration, but not limitation, Proprietary Information shall include any and all technical and non-technical information including patent, applications for grant of patent, copyright, including design copyright, trademarks whether registered or unregistered, registered or unregistered designs, utility models, trade secret, and proprietary information, techniques, sketches, drawings, models, inventions, know-how, processes, apparatus, equipment, algorithms, software programs, software source documents, and formulae related to the current, future and proposed products and services of Company, and the right to apply for them in any part of the world, discoveries, creations, inventions or improvements or upon additions to an invention, confidential information, know-how and any research effort relating to any of the above mention, whether registrable or not, moral rights and any similar rights in any other country and includes, without limitation, its respective information concerning research, experimental work, development, design details and specifications, engineering, financial information, procurement requirements, purchasing manufacturing, customer lists, business forecasts, sales and merchandising and marketing plans and information. "Proprietary Information" also includes proprietary or confidential information of any third party who may disclose such information to Company or the Employee in the course of Company's business.

4. Employee Covenants

4.1 During the continuance of employment under this agreement the Employee shall, devote his whole time and attention to the business of the Company and shall not, without the prior written consent of the Company:

- a. engage in any other business or
- b. be concerned or interested in any other business of a similar nature to or competitive with that, carried on by the Company or any of its subsidiaries or associated companies in relation to its goods and services.

4.2 Nondisclosure of Proprietary Information.

All Proprietary Information is the sole property of the Company, its assigns, and its customers and the Company, its assigns and its customers shall be the sole owner of all patents, copyrights, mask works, trade secrets and other rights in connection therewith. At all times, both during the Employee's employment by the Company and after its termination, the Employee will keep in confidence and trust all Proprietary Information, and the Employee will not use or disclose any Proprietary Information or anything directly relating to it, without the written consent of the Company, except as may be necessary in the ordinary course of performing his duties as an employee of the Company. Notwithstanding the foregoing, it is understood that, at all such times, the Employee is free to use information which is generally known in the trade or industry not as a result of a breach of this Agreement and his own skill, knowledge and know-how to whatever extent and in whatever way the Employee wishes.

4.3 If at any time during his employment under this agreement, the Employee makes or discovers or participates in the making or discovery of any Proprietary Information or Intellectual Property relating to or capable of being used in the business for the time being carried on by the Company or any of its subsidiaries or associated companies, full details of the Proprietary Information and Intellectual Properties shall immediately be communicated by him to the Company and shall be the absolute property of the Company. At the request of the Company, the Employee shall give and supply all such information, data, drawings, and assistance as may be requisite to enable the Company to exploit the Proprietary Information and Intellectual Property to its best advantage and shall execute all documents and do all things which may be necessary or desirable or require by the Company for obtaining patent or copy right or other protection for the Proprietary Information and Intellectual Property in such parts of the world as may be specified for the Company and for assigning / vesting the same in the Company or as it may direct.

4.4 The Employee irrevocably appoints the Company / or the Company's Nominee to be his attorney in his name and on his behalf to sign execute or do any such instrument or thing and generally to use his name for the purpose of giving to the Company (or its nominee) the full benefit of the provisions of this clause and in favour of any third party. A certificate in writing signed by any director or secretary of the Company that any instrument or act falls within the authority conferred by this clause shall be conclusive evidence that such is the case.

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4.5 If the proprietary information or the Intellectual Property is not the property of the Company, the Company shall have the right to acquire for itself or its nominee the Employee's right in the Proprietary Information or Intellectual Property within 3 months after disclosure pursuant to clause 4.3 above on reasonable terms or by arbitration under this agreement.

4.6 Rights and obligations under this clause shall continue in force after termination of this agreement in respect of the Proprietary Information and Intellectual Property made or created during the Employee's employment with the Company and shall be binding upon the Employee's representatives.

4.7 Except as authorized or required by the Employee's duties, the Employee shall keep secret and shall not use or disclose and shall use his best endeavours to prevent the use or disclosure by or to any person of any of the Company's Confidential Information which comes to the Employee's knowledge during his employment.

(a) The restriction set out in the clause above shall apply during and after the termination of the employment of the Employee with the Company, without limit in time.

(b) All records in any medium (whether written, computer readable or otherwise) including accounts, documents, drawings and private notes and all copies and extracts of them made or acquired by the Employee in the course of his employment shall be:

(i) the property of the Company.

(ii) used for the purpose of the Company only.

(iii) returned to the Company on demand at any time; and returned to the Company without demand immediately on the termination of the Employee's employment.

4.8 *Return of Materials / Non destruction.* Upon termination of his employment or at the request of the Company before termination, the Employee will deliver to the Company all written and tangible material (including computer data and all writings and documents to which any intangible property may have been reduced) in his possession incorporating the Proprietary Information or otherwise relating to the Company's business. The Employee shall ensure that no written and tangible material and computer data shall be destroyed or otherwise tampered with, but instead, be returned to the Company upon termination of employment or at the request of the Company, before termination, along with all other properties of the Company.

4.9 The Employee recognizes that the Company will provide the employee with such training as considered necessary by the Company, to aid and enable the Employee to perform the duties assigned by the Company. The Employee accepts and acknowledges that the said training is essential for the purpose of performing various obligations under this Agreement. The Employee further acknowledges that the Company is appropriating its resources for providing such training, which would cost the Company at least Rs. 1,00,000/-, over and above the costs incurred towards the Employee's remuneration and other outgoings for the period during which the Employee undergoes training and consequently, is unable to generate revenue for the Company.

4.10 The Employee acknowledges and recognizes that such training is inherently requisite in the industry, with the result that should the Employee quit the services of the Company, the Company will be constrained to invest significant time, energy and resources in preparing a fresh employee to the substitute for the Employee and in the meantime, suffer loss of business opportunity and remedy.

4.11 The Employee agrees and acknowledges that the Training provided by the Company and the Proprietary Information acquired while working with the Company are very crucial for any person in the similar business.

4.12 The Employee agrees, acknowledges and recognizes that only due to his assurance of working with the Company for the Term, the Company has provided him training as well as the access to Proprietary Information and Intellectual Property. The parties agree and recognize the necessity of negative covenants by the Employee, as hereinafter appearing, in case the Employee quits the services of the Company before the Term, since monetary compensation to the Company, while being necessary, would not be adequate and/or sufficient.

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4.13 The Employee in recognition and consideration of the aforesaid undertakes and covenants with the Company that:

4.13.1 He will not leave, abandon or resign from, the employment with the Company within the Term;

4.13.2 In the event of the Employee leaving, abandoning or resigning the service of the Company in breach of the terms of the agreement before expiry of the Term, the Employee shall not directly or indirectly engage in or carry, on his own accord or jointly with or as manager, agent, consultant or employee of any person, firm or company, or in partnership with others, the business at present being carried on by the Company or business which shall be in competition with the business of the Company, at any location where the Company has a place of business, for the remainder of the Term and in addition to pay the Company, as liquidated damages, the aggregate of the amount equal to the salaries the Employee would have received during the period of 3 months thereafter and the cost incurred by the Company for providing training as also for suffering the Employee during the term of the training without the Employee being able to generate revenue during this period, which, in absence of specific proof by the Company, to be quantified at Rs 1,00,000/- (Rupees One Lac) or 1 month Cost to company salary whichever is higher.

4.14 Such sums as may fall due to the Company by reason of clause 4.13.2 may be recovered by the Company, in whole or in part, by deduction from payment of the final salary, or other payments due to the Employee on termination of employment.

4.15 *No Solicitation.* During the Term of employment with the Company and for a period of two (2) years thereafter, the Employee shall not, whether as principle or agent, and whether alone or jointly with, or as a director, manager, partner, shareholder, employee or consultant of any other person, directly or indirectly:

a) Negotiate with, solicit business from or endeavour to entice away from the Company or any associated company the business of any person, firm, company, or organization who or which to his knowledge is or was a customer, client or agent of the Company during the period of 7 years immediately preceding the termination date, whether or not he had direct dealings or personal contacts in course of his employment during that period, so as to harm the goodwill or otherwise damage the business of the Company.

b) Interfere with, solicit, and endeavor to entice away from the company or employ any person who is grade of the employee of the Company.

4.16 The Employee agrees and accepts that having regard to all circumstances, the restrictions and covenants contained in this clause are reasonable and necessary for the protection of the Company and that they do not bear harshly upon the Employee and agree that:

(a) Each restriction shall be read and construed independently of the other restrictions so that if one or more are found to be void or unenforceable as an unreasonable restraint of trade or for any other reason, the remaining restriction shall not be affected.

(b) If any restriction is found to be void but would be valid and enforceable if some part of it were deleted, or if the restriction is limited in terms of time or place of operation, that restriction shall apply with such deletion or limitation as may be necessary to make it valid and enforceable.

4. Termination of employment:

The employment may be terminated in accordance with the terms and conditions laid down in the Letter of Appointment dated.

5. After Termination:

At no point after the termination date the Employee shall directly or indirectly represent himself as being interested in or employed by or in any way connected with the company, other than a former employee of the Company.

7. Inventions

7.1 As used in this Agreement, the term "Inventions" means any and all new or useful art, discovery, improvement, techniques, technical development, or invention whether or not patentable, and all related know-how, designs, mask works, trademarks, formulae, processes, manufacturing techniques, trade secrets, ideas, artwork, software or other copyrightable or patentable works.

7.2 *Disclosure of Prior Inventions.* The Employee has identified on Exhibit A ("Prior Inventions") attached hereto all Inventions relating in any way to the Company's business or demonstrably anticipated research and development which were made by the Employee prior to his employment with the Company ("Prior Inventions"), and the Employee represents that such list is complete. The Employee represents that the Employee has no rights in any such Inventions other than those Prior Inventions specified in Exhibit A ("Prior Inventions"). If there is no such list on Exhibit A ("Prior Inventions"), the Employee represents that he has made no such Prior Inventions at the time of signing this Agreement.

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7.3 **Ownership of Company Inventions; License of Prior Inventions.** The Employee acknowledges that all original works of authorship which are made by him (solely or jointly with others) within the scope of his employment and which are protectable, either as patents, designs or by copyrights or otherwise intellectual property, are at least "works made for hire" as that term is defined in the (United States Copyright Act (17 USCA § 101) and in India it is covered, inter alia, under Copy Right Act. The Employee hereby agrees promptly to disclose and describe to the Company, and the Employee hereby assigns and agrees to assign to the Company or its designee, his entire right, title, and interest in and to all Inventions and any associated intellectual property rights which the Employee may solely or jointly conceive, develop or reduce to practice during the period of his employment with the Company (a) which relate at the time of conception or reduction to practice of the invention to the Company's business or actual or demonstrably anticipated research or development, or (b) which were developed on any amount of the Company's time or with the use of any of the Company's equipment, supplies, facilities or trade secret information, or (c) which resulted from any work the Employee performed for the Company ("Company Inventions"). In the event the Employee has any right in the Inventions which cannot be assigned, the Employee agrees to waive enforcement worldwide of such right against Company, its employees and licensees or, if necessary, to exclusively license such right worldwide to Company, with the right to sublicense. These rights are assignable by Company. The Employee also waives and agrees never to assert any moral rights, or the equivalent thereof, against Company with respect to any of the rights described above. The Employee also agrees to grant the Company or its designees a royalty free, irrevocable, worldwide license (with rights to sublicense through multiple tiers of distribution) to practice all applicable patent, copyright and other intellectual property rights relating to any Prior Inventions which the Employee incorporate, or permit to be incorporated, in any Company Inventions. Notwithstanding the foregoing, the Employee agrees that he will not incorporate, or permit to be incorporated, such Prior Inventions in any Company Inventions without Company's prior written consent.

7.4 **Future Inventions.** The Employee recognizes that Inventions or Proprietary Information relating to his activities while working for the Company and conceived or made by him, alone or with others, within one (1) year after termination of his employment may have been conceived in significant part while employed by the Company. Accordingly, the Employee agrees that such Inventions and Proprietary Information shall be presumed to have been conceived during his employment with the Company and are to be assigned to the Company¹.

8. Cooperation in Perfecting Rights to Inventions.

(a) The Employee agrees to perform, during and after his employment, all acts deemed necessary or desirable by the Company to permit and assist it, at its expense, in obtaining and enforcing the full benefits, enjoyment, rights and title throughout the world in the Inventions hereby assigned to the Company. Such acts may include, but are not limited to, execution of documents and assistance or cooperation in the registration and enforcement of applicable patents, copyrights, mask works or other legal proceedings.

(b) In the event that the Company is unable for any reason to secure the Employee's signature to any document required to apply for or execute any patent, copyright, mask work or other applications with respect to any Inventions (including improvements, renewals, extensions, continuations, divisions or continuations in part thereof), the Employee hereby irrevocably designate and appoint the Company and its duly authorized officers and agents as his agents and attorneys-in-fact to act for and on his behalf and instead of the Employee, to execute and file any such application and to do all other lawfully permitted acts to further the prosecution and issuance of patents, copyrights, mask works or other rights thereon with the same legal force and effect as if executed by the Employee.

9. No Violation of Rights of Third Parties.

The performance of all the terms of this Agreement by the Employee and as an employee of the Company does not and will not breach any agreement to keep in confidence proprietary information, knowledge or data acquired by the Employee prior to his employment with the Company, and the Employee will not disclose to the Company, or induce the Company to use, any confidential or proprietary information or material belonging to any previous employer or others. The Employee is not a party to any other agreement which will interfere with his full compliance with this Agreement. The Employee agrees not to enter into any agreement, whether written or oral, in conflict with the provisions of this Agreement.

10. Survival.

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This Agreement (a) shall survive the Employee's employment by the Company, (b) does not in any way restrict his right or the right of the Company to terminate his employment at any time, for any reason or for no reason, (c) inures to the benefit of successors and assigns of the Company, and (d) is binding upon his heirs and legal representatives.

11. Injunctive Relief.

A breach of any of the covenants, promises or agreements contained herein will result in irreparable and continuing damage to the Company for which there will be no adequate remedy at law, and the Company shall be entitled to injunctive relief and/or a decree for specific performance, and such other relief as may be proper (including monetary damages if appropriate).

12. Notices.

Any notice required or permitted by this Agreement shall be in writing and shall be delivered as follows with notice deemed given as indicated: (i) by personal delivery when delivered personally; (ii) by overnight courier upon written verification of receipt; (iii) by telecopy or facsimile transmission upon acknowledgment of receipt of electronic transmission; or (iv) by certified or registered mail, return receipt requested, upon verification of receipt. Notices to the employee shall be sent to any address in the Company's records or such other address as the employee may specify in writing. Notices to the Company shall be sent to the Company's Human Resources Department or to such other address as the Company may specify in writing.

13. Governing Law.

This agreement shall be governed by and construed in accordance with the laws of India.

14. Arbitration.

Any dispute under or arising out of this agreement and Appointment Letter whether relating to the interpretation or performance of this Agreement, or otherwise whatsoever, shall be referred to a sole arbitrator to be appointed by the Company in accordance with the provisions of the Arbitration and Conciliation Act, 1996. The seat and venue of the arbitration shall be Ahmedabad.

15. Jurisdiction.

Subject to the provisions of arbitration, the Civil Courts at Ahmedabad alone have the jurisdiction.

16. Severability.

Should any provisions of this Agreement be held by a court of law to be illegal, invalid or unenforceable, the legality, validity and enforceability of the remaining provisions of this Agreement shall not be affected or impaired thereby.

17. Waiver.

The waiver by the Company of a breach of any provision of this Agreement by me shall not operate or be construed as a waiver of any other or subsequent breach by me.

IN WITNESS WHEREOF the parties hereto have hereunto set and subscribed their respective hands and seals the day and year first hereinabove written.

SIGNED SEALED AND DELIVERED

Authorized Signatory of the Company:

Signature:



Signature:



Employer Name: Neha Shah

Employee Name: Kiran Tanwani

Designation: Director, Crest Data Systems Pvt Ltd

(I have signed this agreement voluntarily, without any coercion and undue pressure)



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 Kiran Tanwani	signed the document	Sep 25, 2021 11:10:19 UTC

Confirmation Letter

Date: 20/12/2022

Name: Kiran Tanwani

In recognition of your services and performance towards our Company, we are happy to confirm your employment as “Software Engineer” with effect from 24/11/2022.

Furthermore, we would like to inform you that the same will be in line with the terms and conditions as agreed by you in the employment agreement.

Looking forward to a bright future with Crest Data Systems.

Thanks,

Neha Shah

Neha Shah

Director, Crest Data Systems

Kiran Tanwani

Employee Signature

Kiran Tanwani



Completed Document Audit Report

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IP: 163.116.205.119		
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IP: 163.116.205.119		
 Neha Shah	first viewed document	Dec 20, 2022 07:00:10 UTC
IP: 103.108.207.58		
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IP: 103.108.207.58		
 Kiran Tanwani	first viewed document	Dec 20, 2022 07:28:56 UTC
IP: 103.108.207.58		
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TEAM PLANNER

By

Kiran Tanwani - 91800133033

Ayush Vachhani - 91800133016

Prof. Chandrasinh Parmar

A Project Report Submitted to
Marwadi University in Partial Fulfillment of the Requirements for the B.Tech in Information
and Communication Technology

April, 2022



MARWADI UNIVERSITY
Rajkot-Morbi Road, At & Po. Gauridad,
Rajkot-360003, Gujarat, India.

CERTIFICATE

This is to certify that research/project work embodied in this dissertation titled "Team Planner" was carried out by **Kiran Tanwani and Ayush Vachhaniat Marwadi University** for partial fulfillment of **B.Tech in Information and Communication Technology** to be awarded by Marwadi University. This research/project work has been carried out under my guidance and supervision and it is up to my satisfaction.

Date : 29/04/2022

Place : Rajkot, Gujarat



Prof. Chandrasinh Parmar
(Project Guide)

Prof. Chandrasinh Parmar
(Head of Department)

COMPLIANCE CERTIFICATE

This is to certify that research/project work embodied in this project report titled "Team Planner" was carried out by **Kiran Tanwani(91800133033)** and **Ayush Vachhani(91800133016)** at Marwadi University for partial fulfillment B.Tech to be awarded by Marwadi University. He/ She has complied to the comments given during Review I, Review II, Review II, Review III by Reviewer to my satisfaction.

Date : 29/04/2022

Place : Marwadi University, Rajkot



Kiran

Kiran Tanwani
91800133033

Ayush Vachhani

Ayush Vachhani
91800133016

Prof. Chandrasinh Parmar

Prof. Chandrasinh Parmar
(Project Guide)

PROJECT APPROVAL CERTIFICATE

This is to certify that research/project work embodied in this dissertation titled "Team Planner" was carried out by **Kiran Tanwani(91800133033)** and **Ayush Vachhani(91800133016)** at Marwadi University is approved for the B.Tech in Information and Communication Technology by Marwadi University.

Date : 29/04/2022

Place : Marwadi University, Rajkot



Examiner's Sign and Name:

Handwritten signature of Kapil Shukla in blue ink.

(Kapil Shukla)

Handwritten signature of Dr. Anjan Bhowmik in blue ink.

(Dr. Anjan Bhowmik)

We hereby certify that we are the sole authors of this project work and that neither any part of this thesis nor the whole of the thesis has been submitted for a degree to any other University or Institution.

We certify that, to the best of our knowledge, the current project work does not infringe upon anyone's copyright nor violate any proprietary rights and that any ideas, techniques, quotations or any other material from the work of other people included in our thesis/project work, published or otherwise, are fully acknowledged in accordance with the standard referencing practices. Furthermore, to the extent that we have included copyrighted material that surpasses the boundary of fair dealing within the meaning of the Indian Copyright (Amendment) Act 2012, we certify that we have obtained a written permission from the copyright owner(s) to include such material(s) in the current thesis and have included copies of such copyright clearances to our appendix.

We declare that this is a true copy of thesis/project work, including any final revisions, as approved by thesis/project work review committee.

We have checked write up of the present thesis/project work using anti-plagiarism database and it is in allowable limit. Even though later on in case of any complaint pertaining of plagiarism, we are sole responsible for the same and we understand that as per UGC norms, University can even revoke Degree name conferred to the student submitting this thesis.

Date : 29/04/2022



Kiran Tanwani

Kiran Tanwani
91800133033

Ayush Vachhani

Ayush Vachhani
91800133016

Prof. Chandrasinh Parmar

Prof. Chandrasinh Parmar
(Project Guide)

ACKNOWLEDGEMENTS

I'd like to thank everyone who has assisted me in any way during this training period, whether directly or indirectly. I am especially grateful to our department and institute for providing us with the opportunity to collaborate on a real-world project.

My deepest gratitude to Prof. C.D. Parmar, my project guide and Department Head, for providing me with the chance to obtain practical experience. During the training session, I am appreciative for their instruction, encouragement, and perceptive assistance.

Crest Data Systems is to thank for giving me with the basis on which to create my idea. Also I would like to thank Dharva Mistry, Project Lead at Crest Data Systems for providing me with his guidance for the project.

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ABSTRACT

Team planning for projects is a critical requirement for every firm to operate efficiently on each project it acquires and to enable each person it hires thrive[1]. Organizations typically have a separate team dedicated to team planning and resource management, such as the Project Managing Office (PMO) and Project Managers (PM). These Project Managers construct and organize teams using an excel sheet based on the resources available and the project requirements. Handling big data sets of individuals with diverse skill sets and selecting them for projects with varying criteria can be a time-consuming operation for the Project Management Office; also, when done manually, there is a high risk of disagreements, with a resource being over- or under-utilized. As a result, we've devised a tool we call Team Planner to handle this issue.

Team planner is a web application that will provide the Project Managing Office team complete control over managing resources on any ongoing or new project. Projects and the resources assigned to each project will be represented in a unified UI by Team Planner. The headache of managing resource assignments on an excel sheet will be eliminated with this application. Every Friday, the Project Managing Office team can manage these allocations and disputes using this web application. It will also have a few added features, such as conflict alert, resource choices based on talents, resource suggestions when starting a new project, and so on.

1. Organization Profile

1.1 Introduction of Company

Crest Data Systems was founded in 2013. Presently, it is working at four different locations - Ahmedabad, Pune, Bangalore and USA. It is a leading solutions provider in Data Analytics, Security, DevOps and Cloud[4]. It strives to help customers build cutting-edge solutions that help them outperform their competition and stay ahead of the innovation curve. Crest Data Systems has a diverse experience in successful startups as well as global corporations. It uses Splunk, ServiceNow, Moogsoft, IBM QRadar, Elastic, Datadog etc platforms.

1.2 Quality Policy

Crest Data Systems follows main four values in the business:

- Customer First: Prioritize and measure every outcome based on how well serve to customers
- Empower the Team: Empower each other to grow and lead the way
- Move Fast: Believe in staying agile and executing fast that helps employees to learn and improve faster.
- Equality: Believe in meritocracy. Respect and value people from all backgrounds.
- Continuous Learning: Constantly looking for ways to improve and to do things better.

1.3 Communication

- Address: Bhaskar House, 1st Floor, Sarkhej - Gandhinagar Highway, Makarba, Ahmedabad, Gujarat 380015, India
- Phone No: +91 (79) 4004-4200
- Email: info@crestdatasys.com
- Website: <https://www.crestdatasys.com/>

1.4 Resources

- Blogs: <https://www.crestdatasys.com/blogs/>
- Case Studies: <https://www.crestdatasys.com/case-studies/>

2. Introduction

2.1 Project Definition

Today we know that team Planning is basically a need for every industry. Team planner is a web application that will give all over control of managing resources on every on-going or a new project to the PMO team[1]. Team Planner will provide a seamless UI to represent projects and the resources assigned to each project. This application will remove the headache of managing resource assignments on the excel sheet. Using this web-app every Friday PMO team can manage these allocations and conflicts comfortably. It will also provide a few extra functionalities like an alert on conflict, resource selection based on their skills, a suggestion of resources on new project creation, etc.[2].

2.2 Purpose and Objectives

Every organization has a team that works on different tasks parallelly. Effective planning is required to achieve the goal of the organization. So the main purpose of the proposed system is to automate the task of team planning. The objectives of the system are as follows:

- A tool that can be used to manage the resource plan
- Every team members' project allocation will be scheduled through it
- Details of team members and project will be got through Jira and HRMS API respectively

2.3 About Present System

Generally, an organization uses Microsoft Excel for Resource planning and requests on a weekly basis. So one assigns resources based on availability through excel sheets only. One needs to check for conflicts as well during allocation. This task requires lots of human effort and time.

2.4 Proposed System

Proposed system has come up with the solution which can eliminate the excel based approach with the help of more flexible and sophisticated web based single page application “Team Planner”. Using this system, resource allocation can be done effectively and automatically.

2.5 Modules

There are mainly five modules in the system.

2.5.1 Projects

Project Tab consists of the Projects which are active in JIRA. We will write the Jira Sync cron job to get the projects without manual sync in the Settings tab. Project tab info will be populated from JIRA with below mentioned fields. (Project Name,Epic Key,Epic Name,Business Unit Name,CRM Order Number,Project Lead ,PMO ,PMO Start Date,PMO End Date,BD Dev Start Date,BD Dev End Date,Customer Name,Description ,Logged Hours,PMO Estimated Hours,BD Estimated Hours,QA Lead) . Apart from this we can use filters and search options. By using this we can find project details which we need.

2.5.2 Teams

Team tab consists of the active user of HRMS, API is available to get the data from HRMS. Team tab will consist of below fields

- a. Employee ID
- b. Employee Name
- c. Current Project

In the Team tab, when the user expands the individual employee, the user will get to know about the current allocation. Admin/PMO can change the existing planning by editing and adding new allocation as well. Using filters and search we can see employees by their skills and also we can see projects in which they are allocated.

2.5.3 Request

Request Tab is used to create, accept, manage the requests created by the PM/PMO for resources needed in any projects. This will help resolve if there is any conflict for any resource requests done by multiple PM/PMO.

2.5.4 Report

Report tab will consist of various reports needed for the future as well as the current need of the organization.

2.5.5 Settings

Settings tab consists of the options below.

- Jira Sync - Manual sync when user click on it, it will fetch the latest data from JIRA server.
- HRMS Sync - Manual sync,it will fetch the latest data from HRMS.

2.6 Features

The features are divided based on different types of users and are mentioned as below.

2.6.1 Features for PMO (Project Management Office)

- PMO can create new projects whenever a new project comes and allocate resources based on their skills and availability[3].
- PMO can request particular resources for any on-going projects and new projects.
- PMO will be able to receive notification of the request made by the PM for a resource.
- PMO will be able to see all the details(Project name, PM name, resources requirement, the time period requested for the resource) of a request when they select a particular one.
- PMO will get notification of conflicts when two different PMs will request for the same resources for the same time slots.
- PMO will be able to see all conflicted notifications on their dashboard when they log in to the system.
- PMO will be able to select a request for conflict resolution and can see all the details of conflicted resources(Name, Vertical, Availability, all project details in which this resource is required, etc.) and according to that they assign that conflicted resource to one of the PM's projects also assign conflicted resources to different PM's for different time slots. If it is necessary to do so.
- PMO will be able to edit project details like they can change current allocation of resources in any project,can change technology to be used, can change PM or Tech Lead for a project, get a Tech lead suggestion who has similar experience or has worked on similar Projects before.
- PMO will have functionality to freeze the system till that time PM can request for resource after freezing no PM will be able to request the resource until PMO will unfreeze the system.
- PMO can see conflicted and non-conflicted requests separately.
- PMO will have options for ongoing and past projects on their dashboard.

2.6.2. Features for PM (Project Manager)

- PM will be able to request resources on a weekly basis for assigned projects.
- System will send a notification to the assigned PM about the newly created project
- The PM will be able to see all of the projects assigned to them under My projects.
- The PM will be able to search for resources.
- The PM will be able to see the availability of resources for the next week.
- PM's request will be sent to PMO for resource allocation
- The PM will be able to receive an allocation and alert notifications if resource is granted to them.
- The PM will get a notification or alert if the resource they request is already requested by another PM with the hours/days occupied by another PM.
- PM will be able to suggest other technology that can be used for a project performance.
- The PM will be able to get email about the list of resources that are allocated to them for the next week.

2.6.3 Common Features for PM and PMO

- They will be able to search for resources using filters like by adding technology they get resources who have either worked on similar projects in the past or have the same vertical also can add resources directly by name if required.
- They will be able to see how much time the resource is available next week including leaves and assignment of resources in the other projects.
- They will be able to retrieve reports for the project which include all project-related details (like Project name, PM of the Project, start and end date, resources allocated to that project,).
- They will be able to get details related to projects such as project lead / PM details and project name from JIRA.
- They will be able to search projects based on various filters like Project name, project id, PM assigned, start date, end date i.e all the fields available in the projects tab to describe a project.
- They will be able to search for employees based on various filters like Employee name, Employee id, Designation, i.e all the fields available in the teams tab to describe an employee.
- They will be able to sync with JIRA and HRMS sites to get updated information related to all projects and employee details.
- They will be able to get all updated employee details like employee_id, employee_name, designation, skills, past_projects, current_projects etc from HRMS.
- They will be able to see on-track ongoing and completed projects also delayed and delayed+overworked completed and ongoing projects.

2.6.4 Features for User

- User will be able to get the information about their allocation for the next week
- Also get an email about their allocation for next week.

2.7 System Analysis

2.7.1 Feasibility Study

Feasibility study assesses the various merits of the proposed project such as operational, technical and economical. It aims to be a preliminary review of the facts to check the worthiness of the proposed project before proceeding to the analysis phase. Feasibility study for the proposed project is as follows:

- Operational feasibility:
 - Present system for resource allocation needs more human effort and time to do effective allocation. It gives accuracy but at the cost of human efforts and time. Proposed system will do the task effectively with the least human effort and time. It will be very useful to the leader who plans the work for team members. It also adds values to achieve the goal of an organization. So by viewing all these aspects, the proposed system is operationally feasible.
- Technical feasibility

-
- Nowadays, VueJS is used to build user interfaces and single page applications. Python is also used in backend as it supports many libraries and third party packages. So using these popular technologies, we can easily develop a single page application. There are teams of developers and testers. So separate teams can work on development and testing. Based on these factors, the proposed system is technically feasible.
 - Financial and Economical feasibility
 - Organization has access to some online platforms to learn the new technologies for employees. So training costs for employees is negligible. There is not any specific hardware requirement for the project. Therefore, the proposed system is cost effective as well. By looking at these points, the proposed system is financially feasible.

2.7.2 Requirement Analysis

Requirement Analysis comes after the feasibility study of the project. It includes the user specification for the application. It gives an idea on functions of the application that are to be developed[1]. It also includes necessary details of the application domain, the importance of each function of the system to the user, the scope of the project etc. Hence, it is an important phase in the software development life cycle. There are various techniques in requirement analysis through which we can find the requirements of the proposed system.

■ Facts-Finding Technique

● Interview

- The proposed system has two main stakeholders - (1) Project Lead (PM) and (2) Project Management Officer (PMO). In order to collect the necessary details for the proposed system, we had interviewed both the stakeholders.

● Questionnaire

- The below questions were asked to Project Lead (PM):
- What is your role in the organization?
 - I lead a specific project. I plan the tasks for each sprint and assign them to team mates. I request a resource from the PMO. I also look into the progress of the project.
- How do you request a resource every week?
 - One sheet is shared by the PMO team with all the PMs. In that sheet, all PMs write resources that they need for that week.
- How do you identify the resource for your project?
 - Firstly, I check the resources that are aligned with the required skills from the HRMS portal. Then I check the availability and priority of the resource. After that, I make a request to the PMO on that sheet.
- What kind of difficulties do you face while making a resource request?
 - I need to check the skills, availability, priority, project status etc on different portals and after that I request a resource on that sheet.
- How do you check the progress of the project?

-
- I need to calculate the progress of the project based on the parameters manually. Based on it, I need to plan further tasks.
 - What kind of parameters do you use in order to check the project status?
 - PMO start & end date, PMO estimated hours, Jira status.
 - What kind of functionalities do you expect from the proposed system?
 - I should see all the resource details along with their skills and ratings.
 - I also should see all the project details.
 - I should apply various filters on projects and resources to search the details of my interest.
 - I should see the availability of resources.
 - I should be able to request resources for my project.
 - I should be able to export data of projects and resources in PDF/Excel format.
 - Are there any requirements for reports? If yes, then what kind of reports?
 - Yes, it is required. The report should show the progress of projects in order to plan future tasks.
 - The below questions were asked to Project Management Officer (PMO):
 - What is your role in the organization?
 - I have been assigned some projects. I check the plan designed by the PMs and suggest changes if it is required. I check the progress of different projects from their respective PM. I allocate resources to PMs based on priority and availability.
 - How do you allocate a resource every week?
 - I share one sheet with PMs. They make their requests on that sheet. On Friday, I assign resources to them based on requirements.
 - What kind of difficulties do you face while making a resource allocation?
 - I need to check the experience of resources in a particular domain.
 - I need to check the status of the project.
 - I need to check conflicts for requests.
 - What kind of functionalities do you expect from the proposed system?
 - I should see all the resource details along with their skills and ratings.
 - I also should see all the project details.
 - I should apply various filters on projects and resources to search the details of my interest.
 - I should see the availability of resources.
 - I should be able to see requests with or without conflicts.
 - I should be able to approve or decline a request.
 - I should be able to get details from Jira and HRMS.

-
- I should be able to export data of projects and resources in PDF/Excel format.
 - From where do you get details of the projects?
 - I can get project details from the Jira portal.
 - What type of details do you get from the Jira portal?
 - Project name, project key, epic id, epic name, bd development start & end date, bd estimated and supported estimated hours, bd status, bd approval confidence, business unit, customer name, CRM order id, pmo start & end date, pmo estimated hours, jira status, logged hours etc.
 - How do you check the progress of different projects?
 - I need to calculate the progress of the projects based on the parameters manually. Based on it, I can decide the priority of the project.
 - What kind of parameters do you use in order to check the project status?
 - PMO start & end date, PMO estimated hours, Jira status.
 - Are there any requirements for reports? If yes, then what kind of reports?
 - Yes, it is required. The reports should show the progress of projects, status of employees, availability based on skills, availability based on time etc.
 - Record Review
 - After interviewing Project Lead and Project Management Officer, the below points need to be taken into consideration in order to design the proposed system.
 - The Jira portal contains the project details. So project details should be collected from the Jira portal.
 - The HRMS portal contains the resource details. So resource details should be collected from the HRMS portal.
 - Project Leads should request resources for a specific project to PMO.
 - Project Management Officers should be able to approve or decline the requests done by PMs.
 - There should be generation of various reports based on the available data.
 - Observation
 - After the record review, we can say that the general functionalities for the proposed system are as follows:
 - Functionalities for PMs and PMOs:
 - Login - To login into the system
 - Project_filter - To search the project based on parameters of one's interest
 - Resource_filter - To search the resource details based on parameters of one's interest
 - Availabilty_resources - To show the availability of resources
 - Export_data - To export the data in pdf/excel format

-
- Reports - To generate various reports based on the available data
 - Functionalities for PMs:
 - Request_resource - To request a resource for a particular project
 - Functionalities for PMOs:
 - Jira_sync - To get the project details from the Jira portal
 - HRMS_sync - To get the resource details from the HRMS portal
 - Resource_allocation - To approve or decline a request done by PMs

3. Tools And Technologies.

3.1 Frontend

3.1.1 VueJs

Vue.js is an open-source, progressive JavaScript framework for creating user interfaces that is designed to be adopted in stages. Vue promotes the idea of "data-driven views," where changes in data drive changes in the DOM[5], rather than doing manual updates to the DOM, which can be tedious and error-prone (see jQuery). This concept is at the heart of Vue.js: a reactive data-binding framework that makes keeping your data and the DOM in sync a breeze.

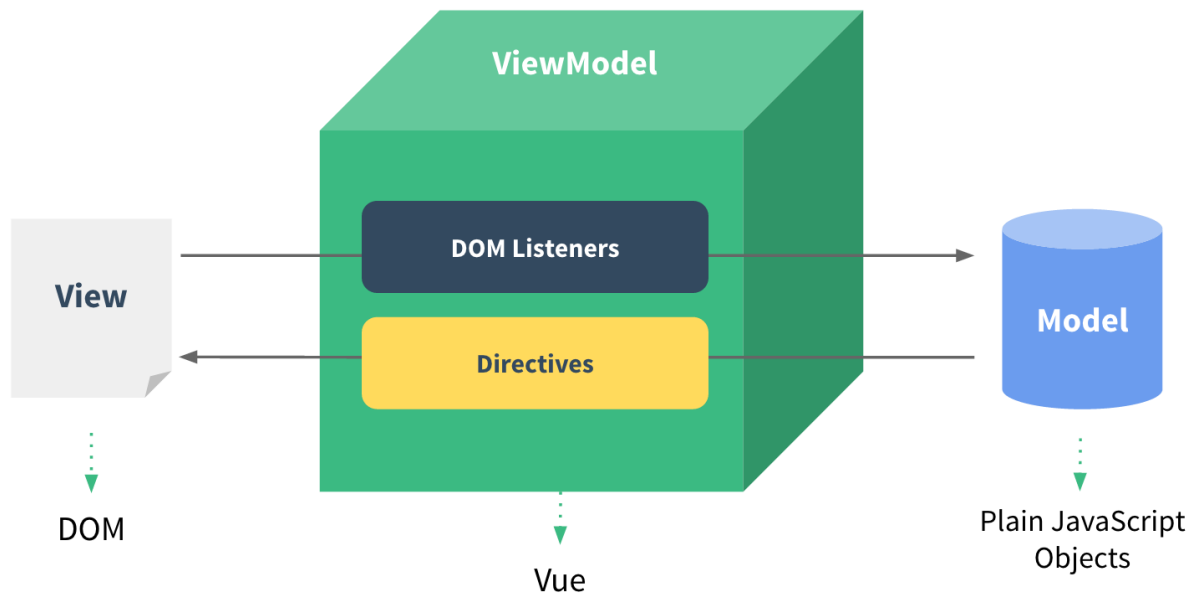


Fig 3.1.1 Architecture of Vue.js app

Vue's strength comes from the fact that it can be extended, transforming it from a simple view-model library to a full-fledged JavaScript framework capable of powering complete SPAs thanks to supporting plugins and libraries like Vue Router, Vue Resource, and Vuex.

3.2 Backend

3.2.1 Python

Python is a high-level, general-purpose programming language. Its design philosophy prioritises code readability and makes extensive use of indentation[6]. Its language elements and object-oriented approach are designed to assist programmers in writing clear, logical code for both small and big projects.

3.2.2 FastAPI

FastAPI is a web framework for constructing APIs with Python 3.6+ based on standard Python type hints that is current and quick (high-performance)[7].

Features :

- **Fast to code:** Increase the speed with which features are developed by 200 percent to 300 percent. **Fewer bugs:** Reduce human (developer)-caused errors by around 40%.
- **Intuitive:** Excellent assistance for editors. Everywhere there is completion. Debugging takes less time.
- **Easy:** Designed to be simple to use and understand. Less time spent reading documents.
- **Short :** Reduce code duplication. Each parameter declaration has multiple features. There are less bugs.

Robust: Get code that is ready for production. With interactive documentation that is generated automatically. **Standards-based:** APIs are based on (and fully compatible with) open standards.

3.2.3 SQLAlchemy

SQLAlchemy is a Python SQL toolkit and Object Relational Mapper that provides complete SQL capability and flexibility to application developers. It includes a full set of well-known enterprise-level persistence patterns, which are designed for fast and efficient database access and have been converted into a simple Pythonic domain language[8].

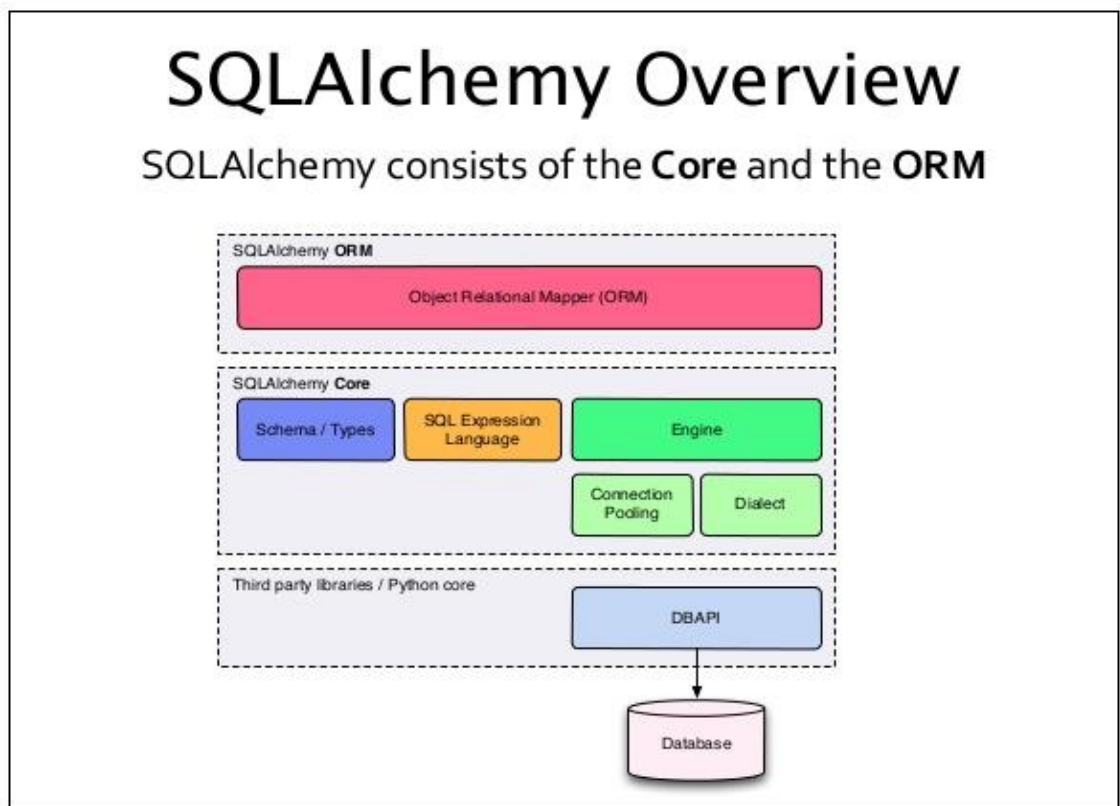


Fig 3.2.1 Architecture of SQLAlchemy

3.3 Database

PostgreSQL comes with many features aimed to help developers build applications, administrators to protect data integrity and build fault-tolerant environments, and help you manage your data no matter how big or small the dataset[\[9\]](#). In addition to being free and open source, PostgreSQL is highly extensible. For example, you can define your own data types, build out custom functions, even write code from different programming languages without recompiling your database.

3.4 Development Tool

Visual Studio Code (famously known as VS Code) is a free open source text editor by Microsoft. VS Code is available for Windows, Linux, and macOS. Although the editor is relatively lightweight, it includes some powerful features that have made VS Code one of the most popular development environment tools in recent times.

4. Project Design

4.1 Context Diagram

A system context diagram in engineering is a diagram that defines the boundary between the system, or part of a system, and its environment, showing the entities that interact with it. This diagram is a high level view of a system.

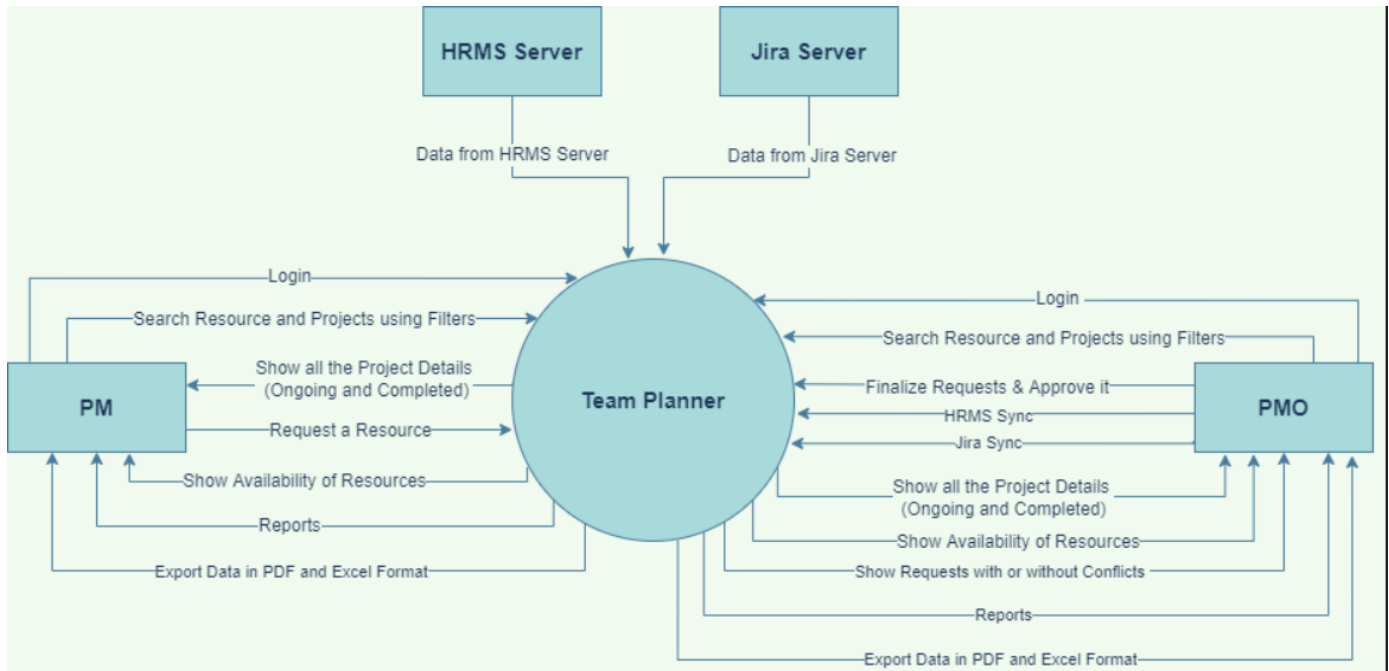


Fig. 4.1.1 - Context Diagram.

As you can see in the context diagram provided basically there are 2 main users which will have features to search resources and projects, finalize or approve requests, see all the details regarding any employee or project. These details are fetched from HRMS and JIRA server respectively.

4.2 DFD Diagram

A data-flow diagram is a way of representing a flow of data through a process or a system. The DFD also provides information about the outputs and inputs of each entity and the process itself. A data-flow diagram has no control flow — there are no decision rules and no loops.

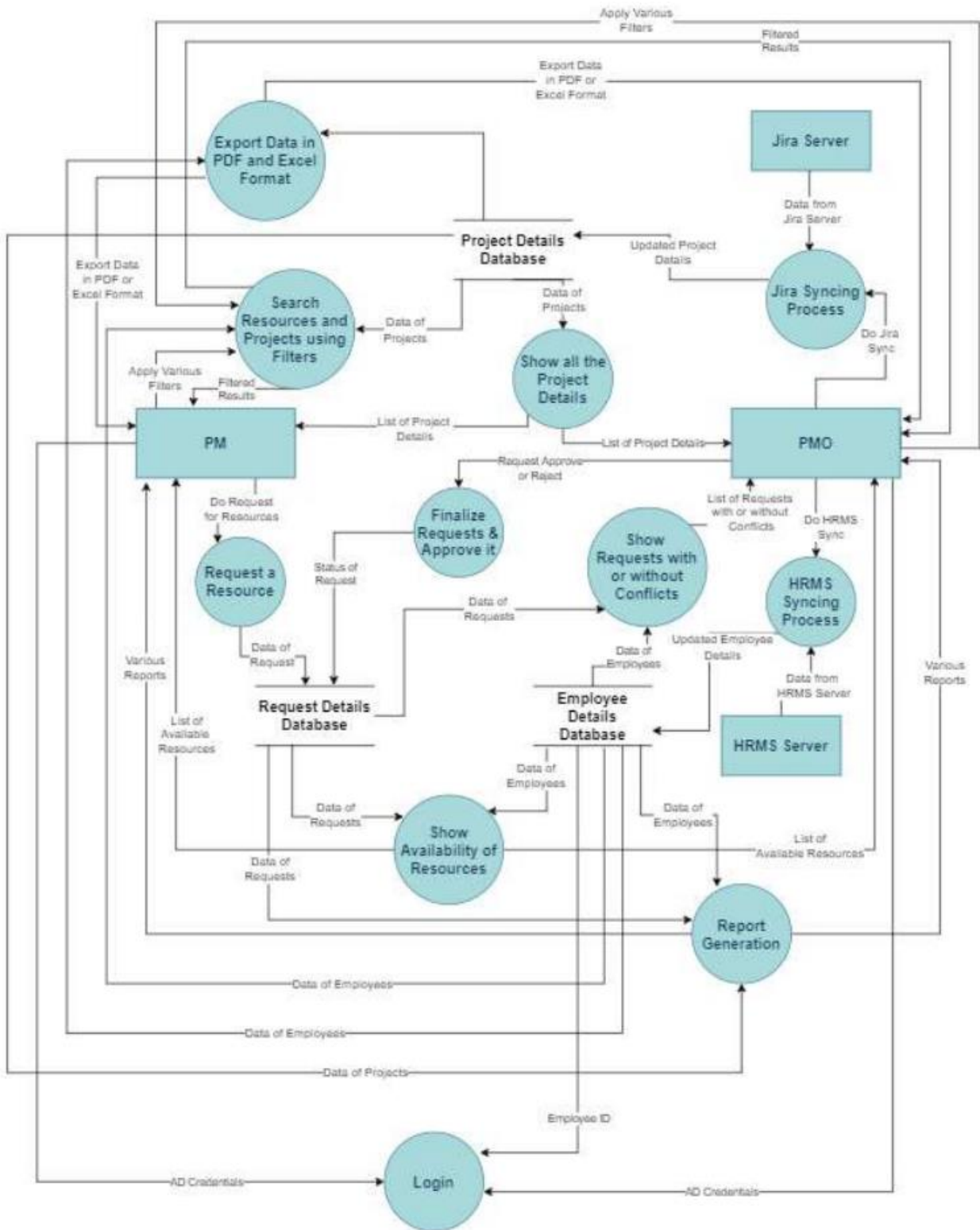


Fig 4.2.1 - DFD Diagram

The Data Flow diagram shows the flow for Team Planner from Login to all the functionalities provided by the system. One can understand how the user will be able to interact with the system with the help of this diagram.

4.3 Architecture

4.3.1 Core Architecture

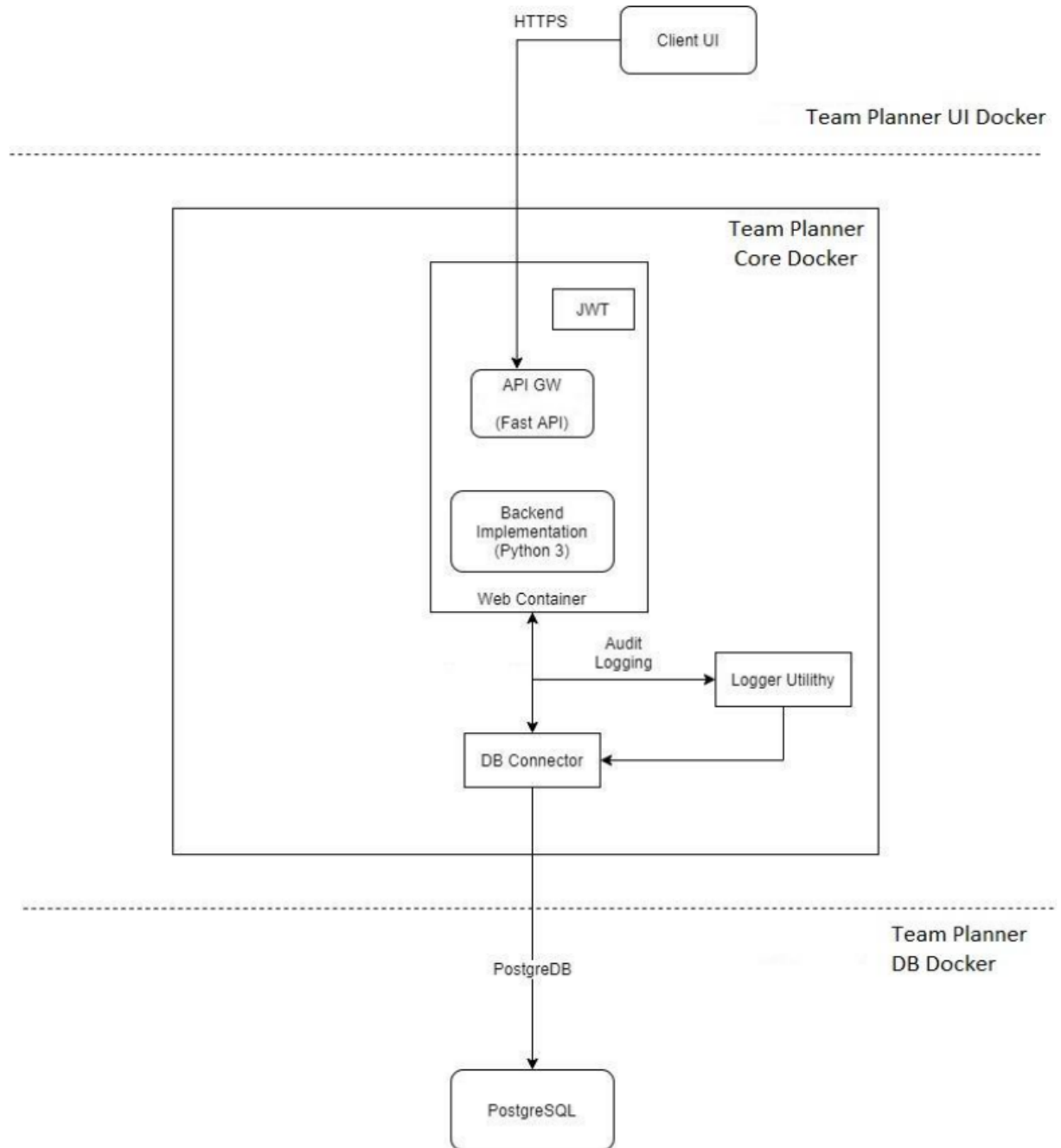


Fig. 4.3.1 Core Architecture.

The Core Architecture diagram shows the connection of UI docker, Backend Docker and Database docker and how the systems will work when accessed by the user from frontend and reach till the database to satisfy the user requirements.

4.3.2 UI Architecture

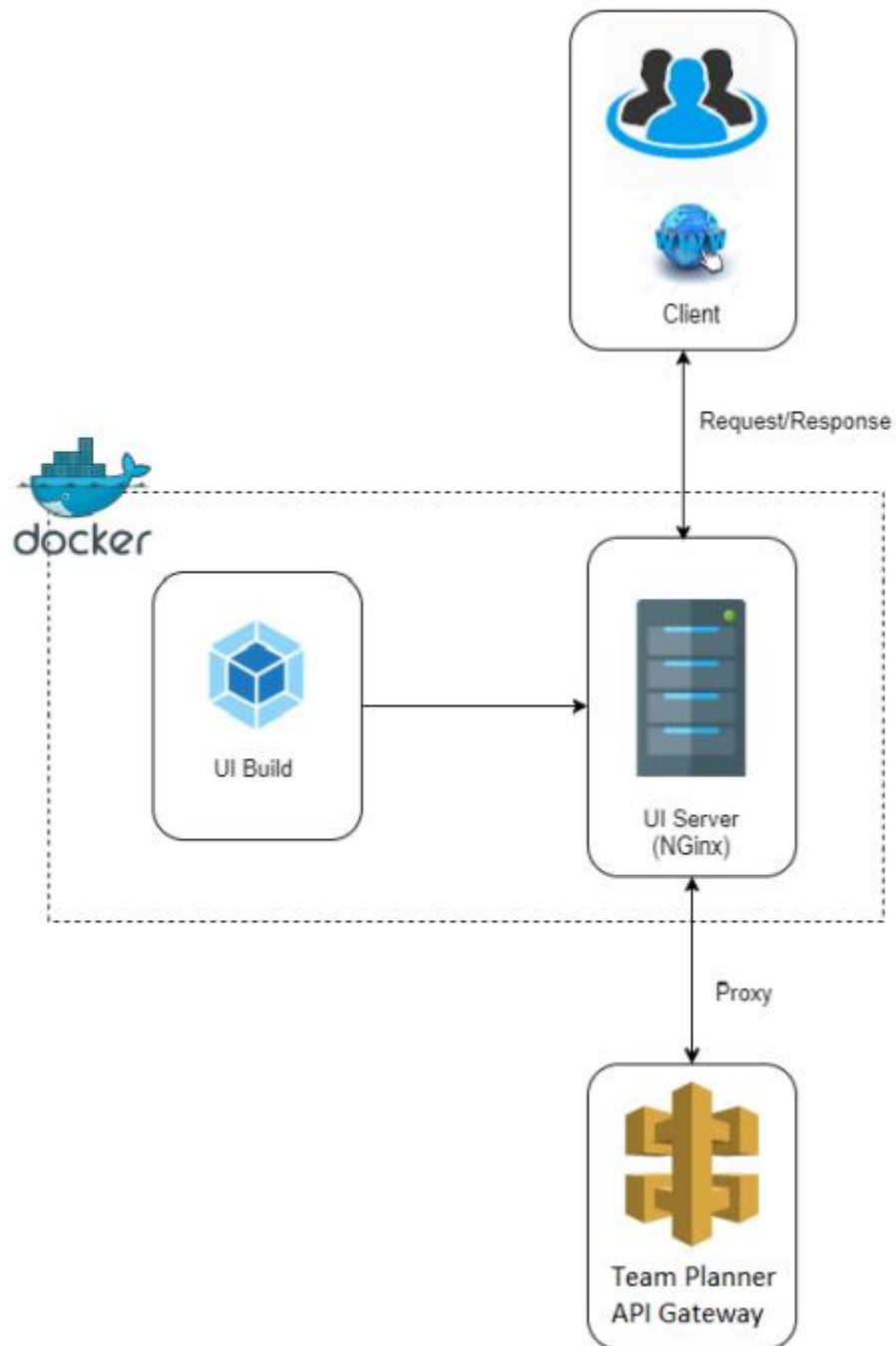


Fig. 4.3.1 UI Architecture.

The UI architecture diagram shows the connection from UI Client with the UI Docker and in turn how it connects with the API Gateway to get the required response for the request created by the end user.

4.3.3 DataBase Schema

4.3.3.1 Project Table

Projects				
Column Name	Type	Nullable	Comment	
id	int4	0	Projects ID (database ID)	PK
project_name	varchar(100)	0	Name of the project	
project_status	enum	1	Details of project status ('On Track', 'On Track + OverWorked', 'Delayed', 'Delayed + OverWorked')	
logged_hours	NUMERIC	1	No of hours logged in the project = actual hours - L&D hours (If any)	

Table 4.3.1.1 Project Table.

The project table includes all the details that are fetched from the JIRA Server and is used to display all or any details regarding the projects in any of the Modules of the Team Planner.

4.3.3.2 Teams Table

Teams				
Column Name	Type	Nullable	Comment	
project_id	int4	0	ID of the project	Composite PK
employee_id	int4	0	Employee id of the employee given by org	
role_id	int4	0	Different role of an employee	

Table 4.3.1.2 Teams Table.

The Teams table stores details of employees with the project they are allocated to and with what role and on what date were they assigned to that particular project.

4.3.3.3 Employee Table

Employee				
Column Name	Type	Nullable	Comment	
employee_id	int4	0	Employee id of the employee given by org	Unique
employee_name	varchar(100)	0	Name of the employee	
hrms_business_unit_id	int4	1	Business unit getting from HRMS	FK

designation_id	int4	1	Designation of an employee	FK
----------------	------	---	----------------------------	----

Table 4.3.1.3 Employee Table.

The Employee table stores the data for all the employees with the status of whether the employee is currently working in the organization or not. The system does not remove details of the employees that are no longer the part of the company, this is done because if some projects need to be reopened so the user can know who all worked on the project previously.

4.3.3.4 Logs Table

logs				
Column Name	Type	Nullable	Comment	
id	int4	0	Logs ID (database ID)	PK
message	varchar(500)	0	Message of the log	
log_type	enum	0	Type of the log ('Info', 'Error', 'Warn', 'Debug')	

Table 4.3.1.4 Logs Table.

The Logs table maintains the records of all the logs regarding any activity done in the system. Be it fetching of projects from JIRA or employee details from HRMS, calculating any resource requirements or any error occurred in the flow of the system.

4.3.3.5 Sync-info Table

sync_info				
Column Name	Type	Nullable	Comment	
id	int4	0	Last Sync ID (database ID)	PK
app_name	enum	0	Name of the app (hrms, jira)	
last_synced_on	datetime	0	Data entry of last synced updated date and time	

Table 4.3.1.5 Sync-info Table.

The Sync_Info table stores the date for when the last JIRA or HRMS sync was performed for fetching the data of projects and employees respectively. This also stores if there was any error while syncing with JIRA or HRMS as that will help to get a better understanding for anyone working on the system.

4.3.3.6 Role Table

Role				
Column Name	Type	Nullable	Comment	
id	int4	0	Role ID (database ID)	PK
role_name	varchar(30)	0	Name of the role	

Table 4.3.1.6 Role Table.

The Role table maintains all the types of roles of employees present in the organization.

4.3.3.7 Customer Table

Customer				
Column Name	Type	Nullable	Comment	
id	int4	0	Customer ID (Database ID)	PK
customer_name	varchar(100)	0	Name of the customer	

Table 4.3.1.7 Customer Table.

The Customer table maintains the records of all the customers the organization deals with for any kind of projects.

4.3.3.8 Jira Business Unit Table

Jira_Business_unit				
Column Name	Type	Nullable	Comment	
id	int4	0	Business ID (Database ID)	PK
business_unit	varchar(100)	0	Name of the business unit	

Table 4.3.1.8 Jira Business Unit Table.

The Jira Business Unit Table maintains the records of all types of Business Unit present in the organization.

4.3.3.9 Skills Table

Skills				
Column Name	Type	Nullable	Comment	
id	int4	0	Skill ID (getting from HRMS)	PK
skill_name	varchar(100)	0	Name of the skill	

Table 4.3.1.9 Skills Table.

The Skills table maintains the records of all types of skills that any employee can possess.

4.3.3.10 Designation Table

Designation				
Column Name	Type	Nullable	Comment	
id	int4	0	Designation ID (getting from HRMS)	PK
designation_name	varchar(50)	0	Name of the designation	

Table 4.3.1.10 Designation Table.

The Designation table maintains the records of all the designations provided to any employee in the organization.

4.3.3.11 HRMS Business Unit Table

HRMS_Business_unit				
Column Name	Type	Nullable	Comment	
id	int4	0	Business ID (getting from HRMS)	PK
business_unit	varchar(100)	0	Name of the business unit	

Table 4.3.1.11 HRMS Business Unit Table.

The HRMS Business Unit Table maintains the records of all type of Business Units present in the HRMS of the organization.

4.4 API Gateway

The solution will contain an API gateway that will be used to interact with the core services of the AMS. All the API calls are authenticated using the JWT authentication scheme. The API gateway will use the FastAPI framework along with uvicorn to serve the requests. Rate limiting of the API will be a setup-time parameter. List of Endpoints that will be exposed by API gateway. The API documentation is autogenerated.

Context	Functions
/login	Authentication endpoint to validate the user credentials and store an authentication token.
/get-login-user	This endpoint to get information of logged in users.
/api/create-project	This endpoint enables users(pmo) to create new projects.

/api/all-project-details	This endpoint provides all detailed information of all projects.
/api/projectdata-by-pid/{pid}	This endpoint provides information of a particular project based on project id.
/api/projectdata-by-projectname/{project_name}	This endpoint provides information of a particular project based on the project name.
/api/update-project-details-pmo/{pid}	This endpoint provides users(pmo) to update the project details of particular projects based on project id.
/api/update-project-details-pm/{pid}	This endpoint provides users(pm) to update the project details of particular projects based on project id.
/add-employee	This endpoint provides users(pmo/pm)a way to add new employees to the database.
/update-employee/{employee_id}	With this endpoint user can update an employee's details based on the employee id.
/get-all-employees	This endpoint provides all detailed information of all employees.
/get-employees/{employee_id}	This endpoint provides all detailed information of a particular employee based on employee id.
/get-employee-name/{employee_name}	This endpoint provides all detailed information of a particular employee based on employee name.
/sync/{sync_name}	This endpoint provides user to update the database of team planner with changes in JIRA and HRMS
/all-dropdowns	This endpoint provides all dropdowns information.

Table 4.4.1 API Gateway Table.

4.5 Assumptions

Followings are the assumptions taken while considering the design of the solution. It is assumed that:

1. The Employee database will be accessible using the HRMS APIs.
2. The Projects database will be accessible using the JIRA APIs.

4.6 Security Consideration

Following are the security considerations:

1. The application components will not use any third-party modules, frameworks which have known vulnerabilities.
2. In order to provide the best security, the web application will use JWT authentication tokens.
3. To provide HTTPS support the web application will require to have its own dedicated HOST with its dedicated IP address and SSL Certificate.

5. Implementation

5.1 Login Module

The first screen that appears while using the system is the Login screen, where the user has to login with their Active Directory credentials.

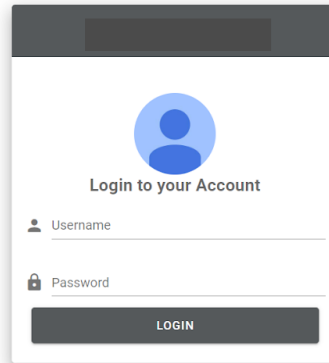
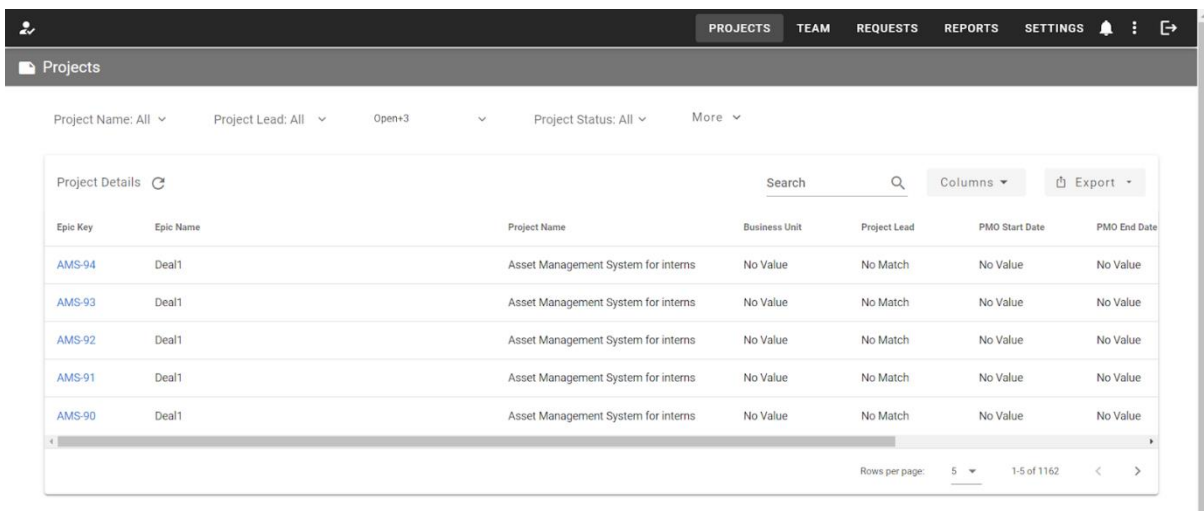


Fig. 5.1.1 - Login screen.

5.2 Project Module

Projects Tab is the first screen the user will see after logging in the system. This screen is the Dashboard of the system. Project Tab consists of the Projects which are active in JIRA. We will write the Jira Sync cron job to get the projects without manual sync in the Settings tab. Project tab info will be populated from JIRA with fields like - . (Project Name, Epic Key, Epic Name, Business Unit Name, CRM Order Number, Project Lead ,PMO ,PMO Start Date, PMO End Date, BD Dev Start Date, BD Dev End Date, Customer Name, Description ,Logged Hours, PMO Estimated Hours, BD Estimated Hours, QA Lead)



The screenshot shows a web application interface for the 'Projects' tab. At the top, there is a navigation bar with tabs for 'PROJECTS', 'TEAM', 'REQUESTS', 'REPORTS', and 'SETTINGS'. Below the navigation bar, there are several filter options: 'Project Name: All', 'Project Lead: All', 'Open+3', and 'Project Status: All'. The main content area displays a table of project details. The table has columns for 'Epic Key', 'Epic Name', 'Project Name', 'Business Unit', 'Project Lead', 'PMO Start Date', and 'PMO End Date'. The data rows show projects with Epic Keys like AMS-94, AMS-93, AMS-92, AMS-91, and AMS-90, all with Epic Name 'Deal1' and Project Name 'Asset Management System for interns'. The Business Unit is 'No Value', Project Lead is 'No Match', and PMO Start and End Dates are 'No Value'. At the bottom of the table, there is a pagination control showing 'Rows per page: 5' and '1-5 of 1162'.

Epic Key	Epic Name	Project Name	Business Unit	Project Lead	PMO Start Date	PMO End Date
AMS-94	Deal1	Asset Management System for interns	No Value	No Match	No Value	No Value
AMS-93	Deal1	Asset Management System for interns	No Value	No Match	No Value	No Value
AMS-92	Deal1	Asset Management System for interns	No Value	No Match	No Value	No Value
AMS-91	Deal1	Asset Management System for interns	No Value	No Match	No Value	No Value
AMS-90	Deal1	Asset Management System for interns	No Value	No Match	No Value	No Value

Fig. 5.2.1 - Project Screen.

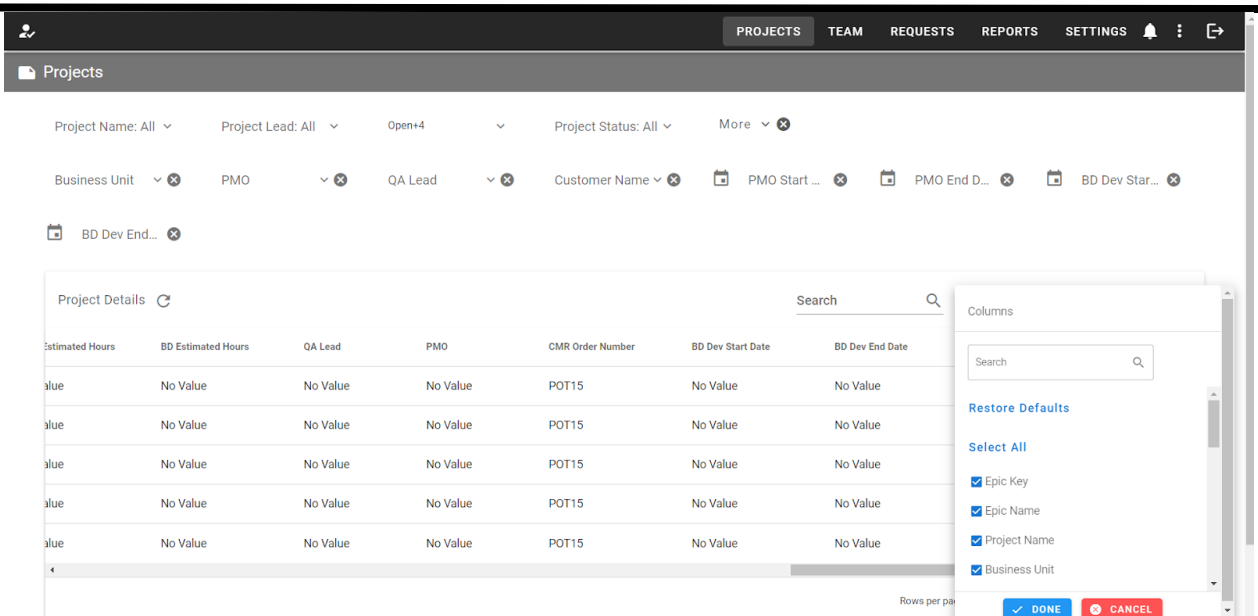


Fig. 5.2.2 - More Columns Option.

Here the user can select what columns should appear on the screen for the project details as JIRA provides many fields so users can see ones that are important for them.

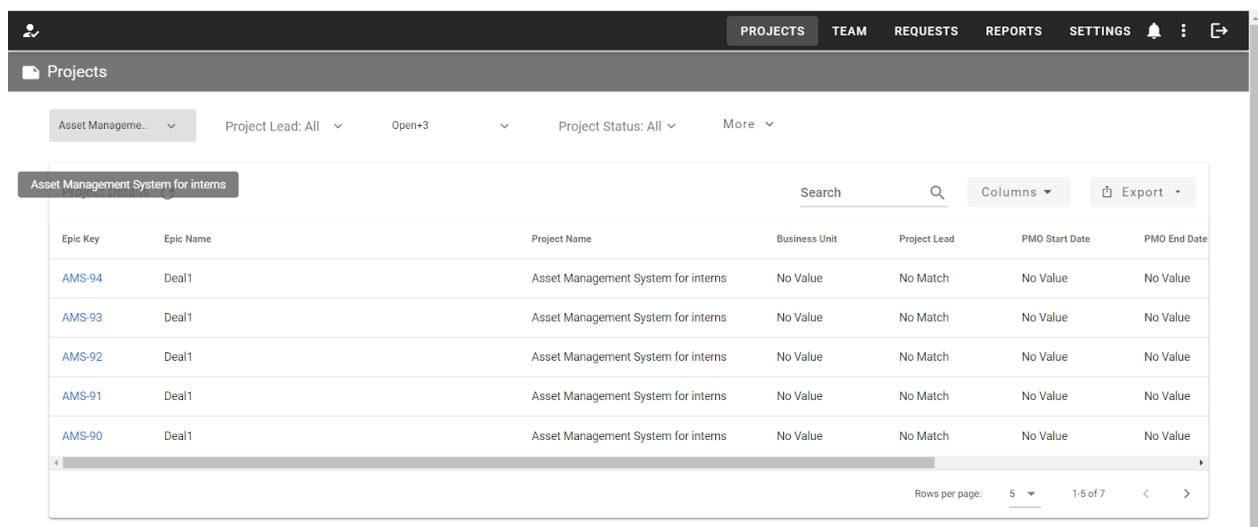


Fig. 5.2.3 - Filter by Project Name Option.

As you can see in the above image the user can choose to filter the data based on columns. In the above image it is done based on Project Name.

Asset Manageme... Project Lead: All Open+3 Project Status: All More

Project Details New, Untraige, Open, Complete Search Columns Export

Epic Key	Epic Name	Project Name	Business Unit	Project Lead	PMO Start Date	PMO End Date
AMS-94	Deal1	Asset Management System for interns	No Value	No Match	No Value	No Value
AMS-93	Deal1	Asset Management System for interns	No Value	No Match	No Value	No Value
AMS-92	Deal1	Asset Management System for interns	No Value	No Match	No Value	No Value
AMS-91	Deal1	Asset Management System for interns	No Value	No Match	No Value	No Value
AMS-90	Deal1	Asset Management System for interns	No Value	No Match	No Value	No Value

Rows per page: 5 1-5 of 7

Fig. 5.2.4 - Filter by JIRA Status Option.

In the above image the filter for JIRA status is applied. As you can see multiple values can be selected from the filter which are shown in the tooltip of the filter and the number of values selected are shown in the filter name as +(number).

Project Name: All Project Lead: All Open On Track + Over.+1 More

Project Details New, Untraige, Open, Complete Search Columns Export

Epic Key	Epic Name	Project Name	Business Unit	Project Lead	PMO Start Date	PMO End Date
AMS-94	Deal1	Asset Management System for interns	No Value	No Match	No Value	No Value
AMS-93	Deal1	Asset Management System for interns	No Value	No Match	No Value	No Value
AMS-92	Deal1	Asset Management System for interns	No Value	No Match	No Value	No Value
AMS-91	Deal1	Asset Management System for interns	No Value	No Match	No Value	No Value
AMS-90	Deal1	Asset Management System for interns	No Value	No Match	No Value	No Value

Rows per page: 5 1-5 of 453

Fig. 5.2.5 - Filter by Project Status Option.

In the above image the filter for Project Status is applied and only those projects are visible that have the project status selected in the filter.

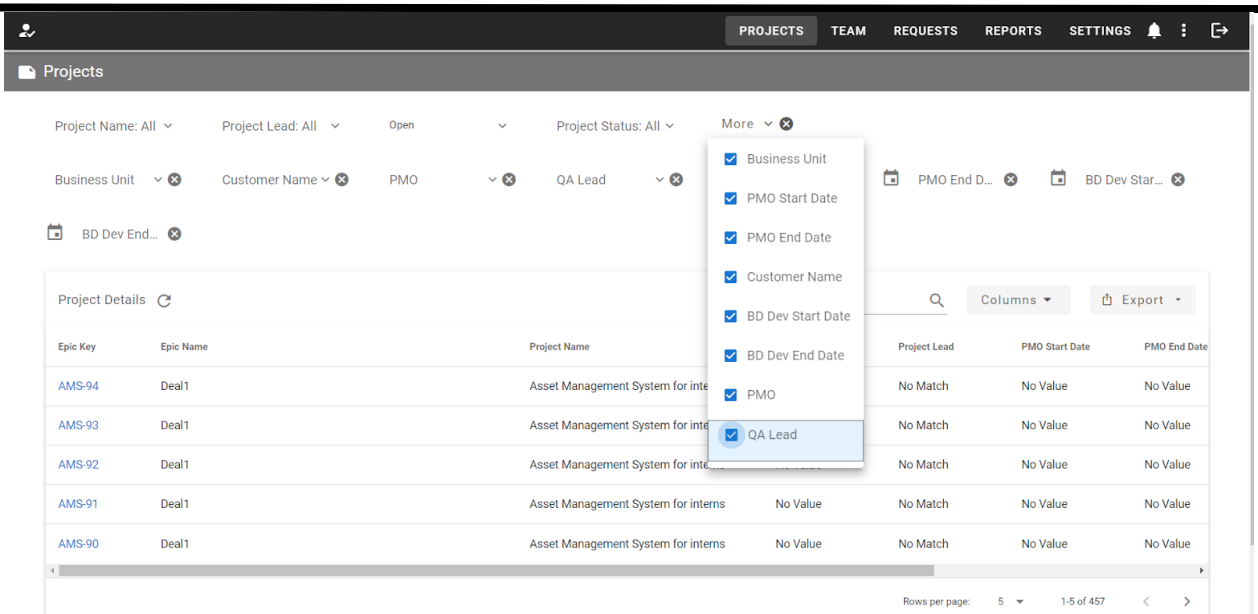


Fig. 5.2.6 - More Filters.

As you can see in the above image there is an option for the user to choose from different column values as filters to restrict the data to be displayed.

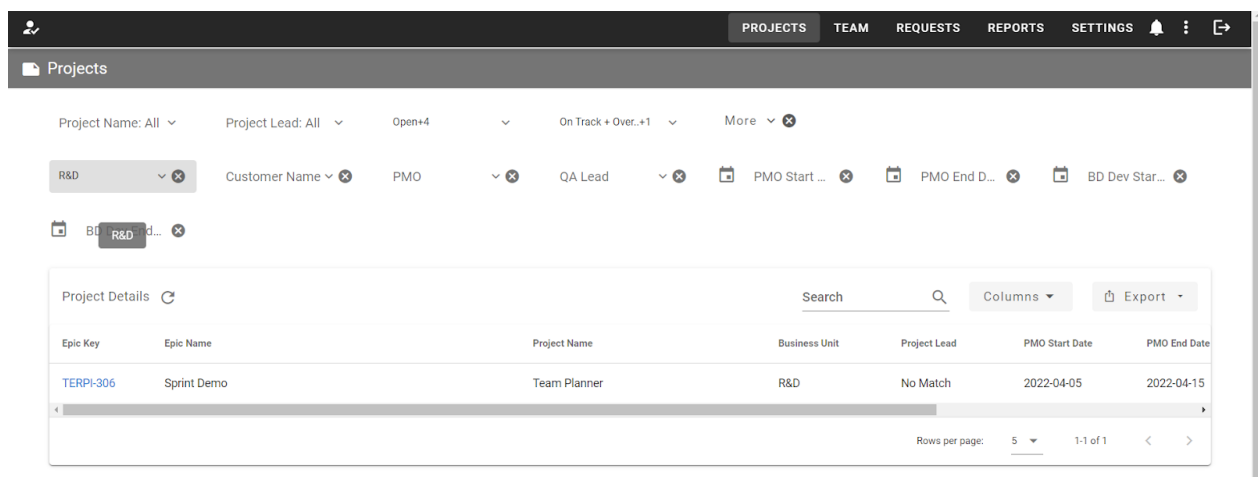


Fig. 5.2.7 - Filter by Business Unit Filter Option.

In the above image the Business unit filter is applied and as we can see only one project has the Business unit as R&D.

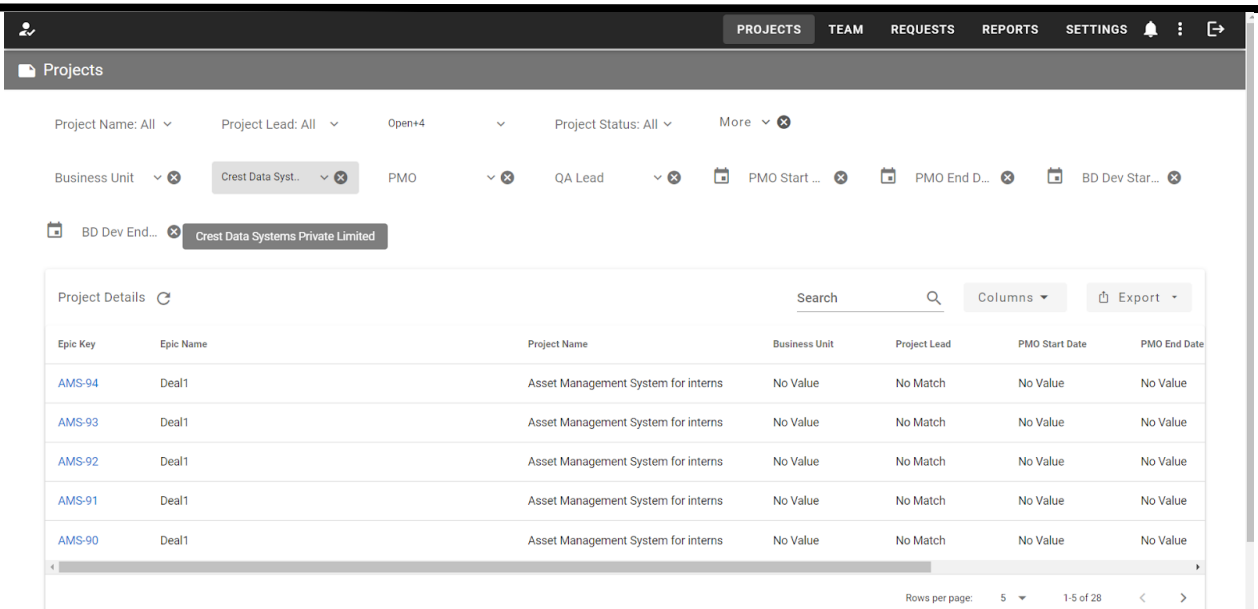


Fig. 5.2.8 - Filter by Customer Name Option.

In the above image the Customer Name filter is applied and as you can see there are 20 projects with the selected customer name and since the pagination is set to 5 per page only 5 are displayed.

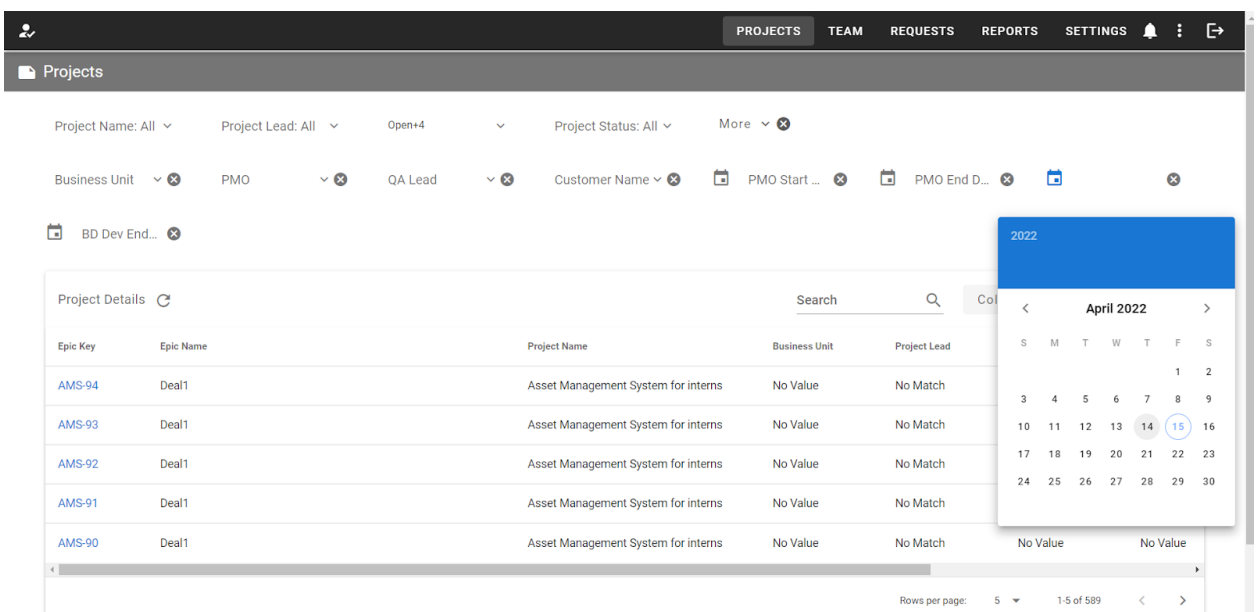


Fig. 5.2.9 - Filter by BD Dev Start Date Option.

In the above image the BD Dev Start Date filter is applied and as you can see for the filters with dates calendar is provided for the ease of user to select dates.

Project Name: All | Project Lead: All | Open+4 | Project Status: All | More

Business Unit: PMO | QA Lead | Customer Name | PMO Start ... | PMO End D... | BD Dev Star...

BD Dev End...

Project Name	Business Unit	Project Lead	PMO Start Date	PMO End Date	Jira Status	Project Status	Customer
Asset Management System for interns	No Value	No Match	No Value	No Value	Open	No Value	Crest Da Limited
Asset Management System for interns	No Value	No Match	No Value	No Value	Open	No Value	Crest Da Limited
Asset Management System for interns	No Value	No Match	No Value	No Value	Open	No Value	Crest Da Limited
Asset Management System for interns	No Value	No Match	No Value	No Value	Open	No Value	Crest Da Limited
Asset Management System for interns	No Value	No Match	No Value	No Value	Open	No Value	Crest Da Limited

Rows per page: 5 | 1-5 of 589

Fig. 5.2.10 - Horizontal Scrollbar - 1

As there are a lot of columns which cannot be viewed on the screen at once a horizontal scrollbar is provided to see all the column values.

Project Name: All | Project Lead: All | Open+4 | Project Status: All | More

Business Unit: PMO | QA Lead | Customer Name | PMO Start ... | PMO End D... | BD Dev Star...

BD Dev End...

PMO End Date	Jira Status	Project Status	Customer Name	On Track	Delayed	OverWorked	Logged Hours	PMO Estimated Hours	BD
No Value	Open	No Value	Crest Data Systems Private Limited	No Value	No Value	No Value	No Value	No Value	No
No Value	Open	No Value	Crest Data Systems Private Limited	No Value	No Value	No Value	No Value	No Value	No
No Value	Open	No Value	Crest Data Systems Private Limited	No Value	No Value	No Value	No Value	No Value	No
No Value	Open	No Value	Crest Data Systems Private Limited	No Value	No Value	No Value	No Value	No Value	No
No Value	Open	No Value	Crest Data Systems Private Limited	No Value	No Value	No Value	No Value	No Value	No

Rows per page: 5 | 1-5 of 589

Fig. 5.2.11 - Horizontal Scrollbar - 2

PROJECTS TEAM REQUESTS REPORTS SETTINGS

Projects

Project Name: All Project Lead: All Open+4 Project Status: All More

Business Unit PMO QA Lead Customer Name PMO Start ... PMO End D... BD Dev Star... BD Dev End...

Project Details Search Columns Export

Delayed	OverWorked	Logged Hours	PMO Estimated Hours	BD Estimated Hours	QA Lead	PMO	CMR Order Number	BD Dev Start Date
No Value	No Value	No Value	No Value	No Value	No Value	No Value	POT15	No Value
No Value	No Value	No Value	No Value	No Value	No Value	No Value	POT15	No Value
No Value	No Value	No Value	No Value	No Value	No Value	No Value	POT15	No Value
No Value	No Value	No Value	No Value	No Value	No Value	No Value	POT15	No Value
No Value	No Value	No Value	No Value	No Value	No Value	No Value	POT15	No Value

Rows per page: 5 1-5 of 589

Fig. 5.2.12 - Horizontal Scrollbar - 3

PROJECTS TEAM REQUESTS REPORTS SETTINGS

Projects

Project Name: All Project Lead: All Open+4 Project Status: All More

Business Unit PMO QA Lead Customer Name PMO Start ... PMO End D... BD Dev Star... BD Dev End...

Project Details Search Columns Export

Estimated Hours	BD Estimated Hours	QA Lead	PMO	CMR Order Number	BD Dev Start Date	BD Dev End Date	BD Supported Estimated Hours	View
No Value	No Value	No Value	No Value	POT15	No Value	No Value	No Value	View
No Value	No Value	No Value	No Value	POT15	No Value	No Value	No Value	View
No Value	No Value	No Value	No Value	POT15	No Value	No Value	No Value	View
No Value	No Value	No Value	No Value	POT15	No Value	No Value	No Value	View
No Value	No Value	No Value	No Value	POT15	No Value	No Value	No Value	View

Rows per page: 5 1-5 of 589

Fig. 5.2.13 - Horizontal Scrollbar - 4

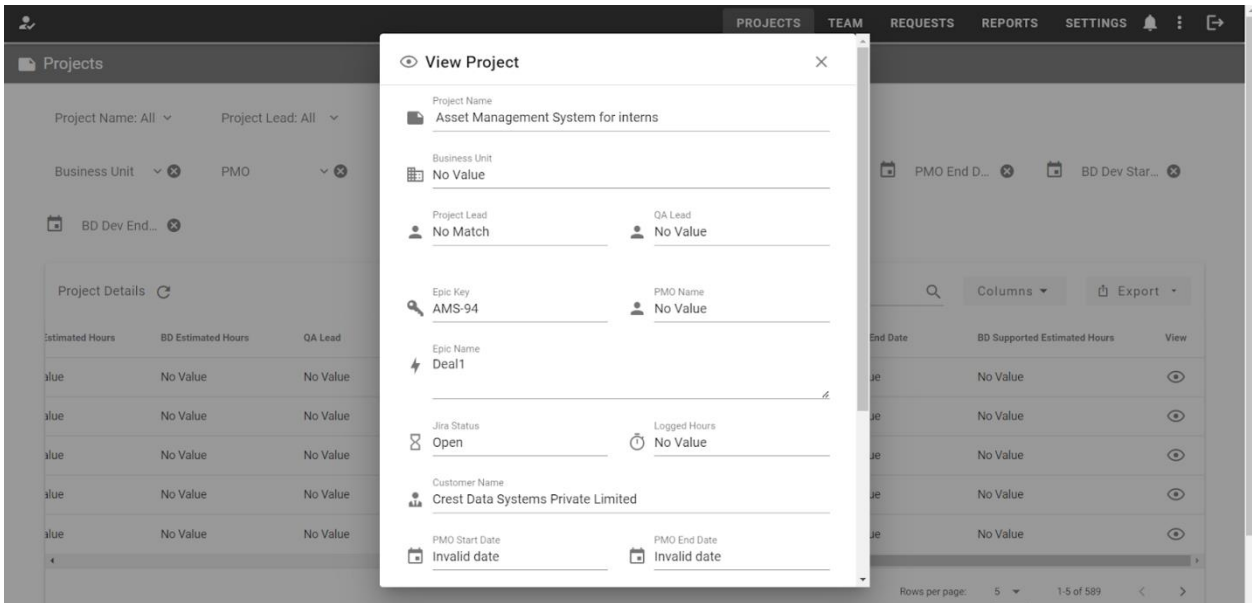


Fig. 5.2.14 - View Project - 1

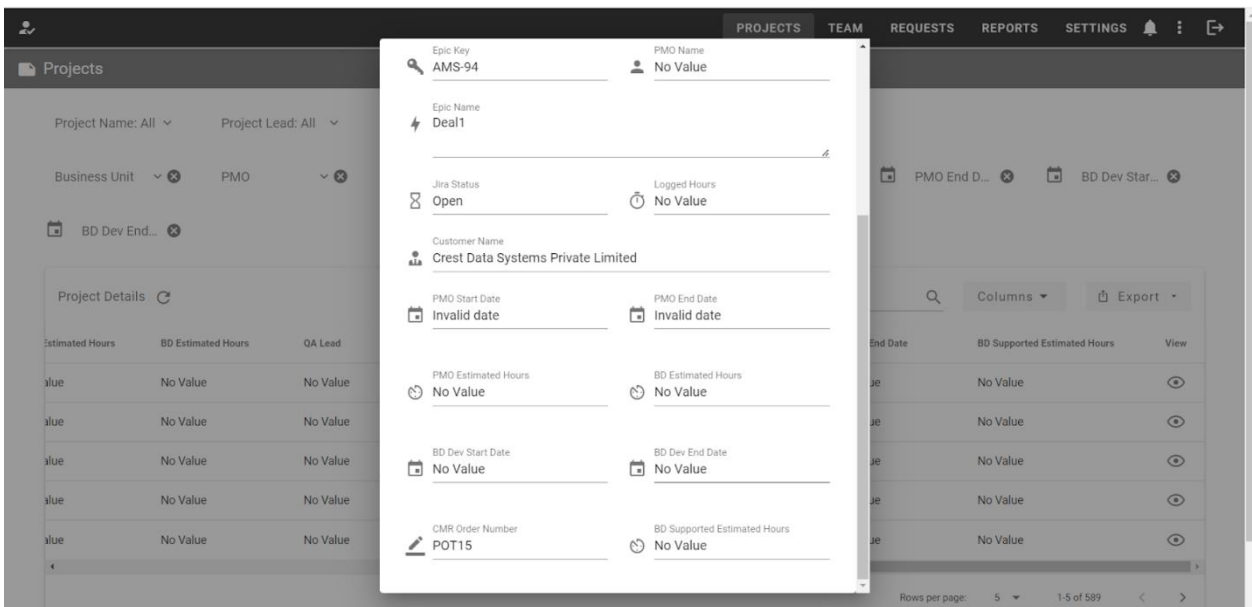


Fig. 5.2.15 - View Project - 2

The above images show the view project option which shows all the fields of a project in a model. As the details cannot get into one screen a vertical scrollbar is provided.

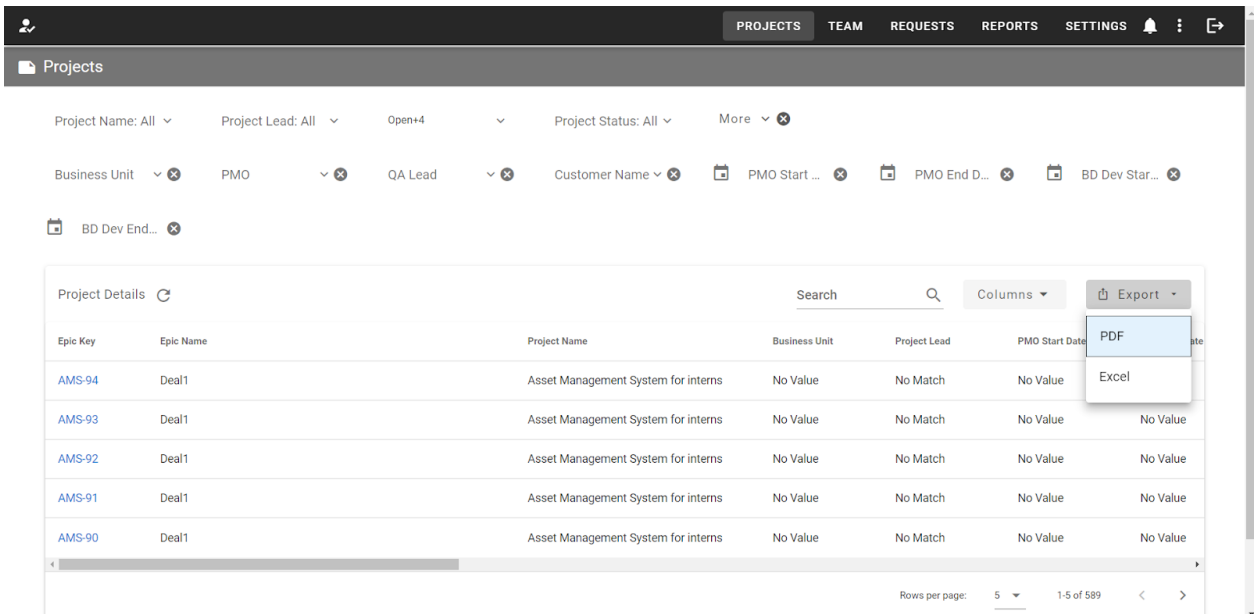


Fig. 5.2.16 - Export Data

The above image shows the export options available for exporting the displayed project details in the form of PDF or Excel.

5.3 Teams Module

The Teams Module consists of details of all the Employees present in the organization. The details of the Employees are fetched from HRMS portal.

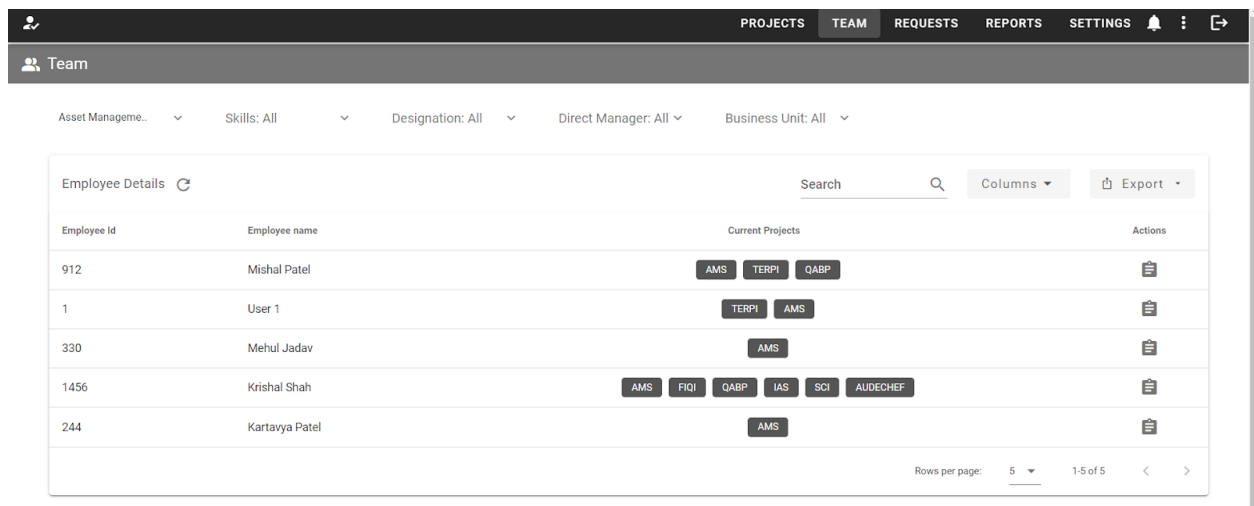


Fig. 5.3.1 - Team Tab

The Team Tab by default looks like the above image.

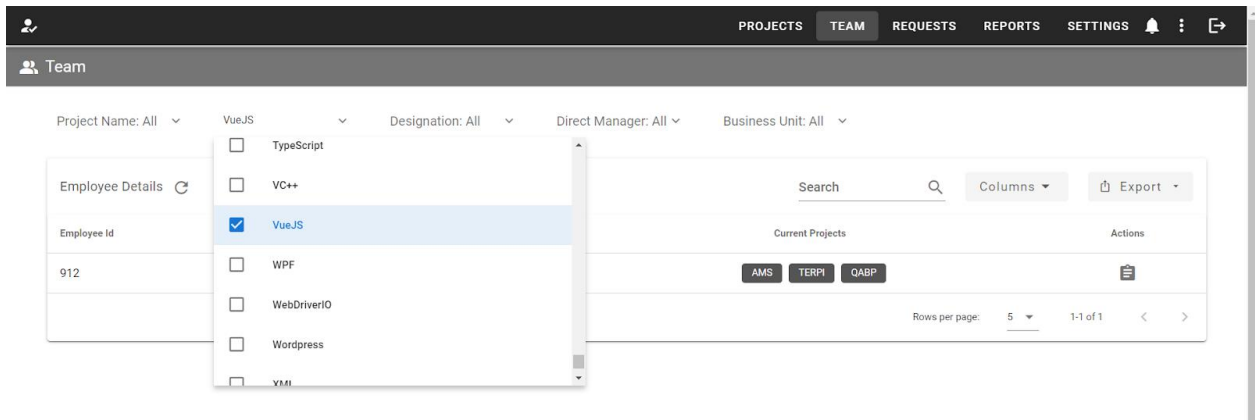


Fig. 5.3.2 - Filter by Skills Option.

Just like in Projects Module the Teams Module also has various filters based on columns present in the description of an employee. In the above image filter based on the skills options is applied to the teams module.

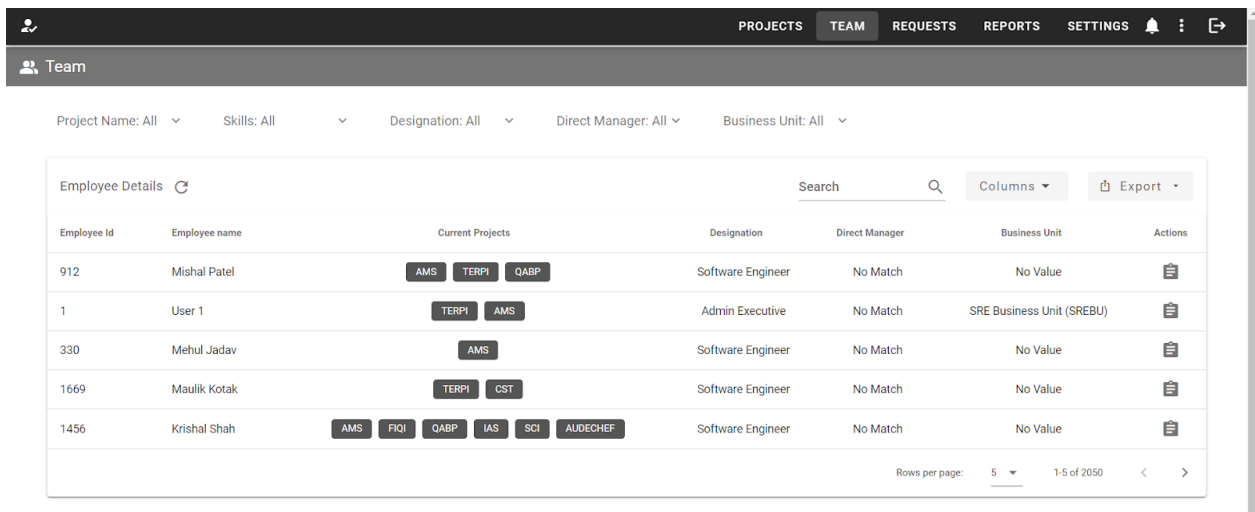


Fig. 5.3.3 - Add Columns Option.

As you can see in the above image users can select what all columns to display on the screen from the columns dropdown. Here columns like Designation, Direct Manager and Business Unit are added which were previously not visible.

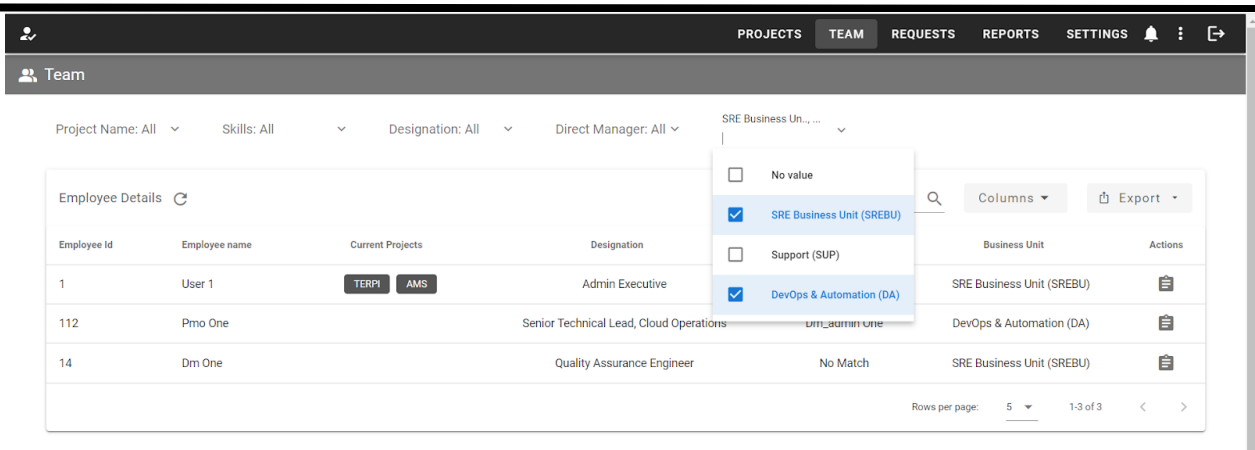


Fig. 5.3.4 - Filter by Business Unit Option.

In the above image the Business Unit filter is applied to the teams tab.

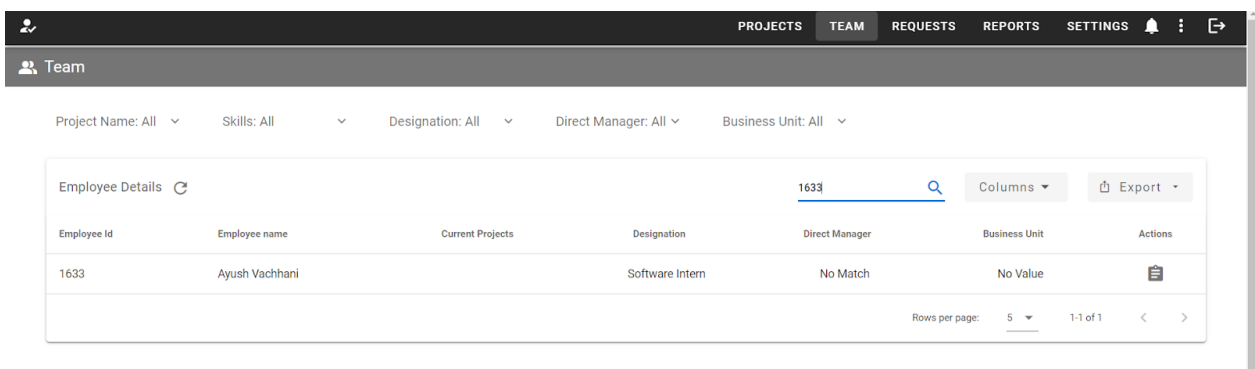


Fig. 5.3.5 - Search Option.

As you can see above, the image search option is available for the user to search for any keyword on the screen to display the employee having the keyword in any of the column values.

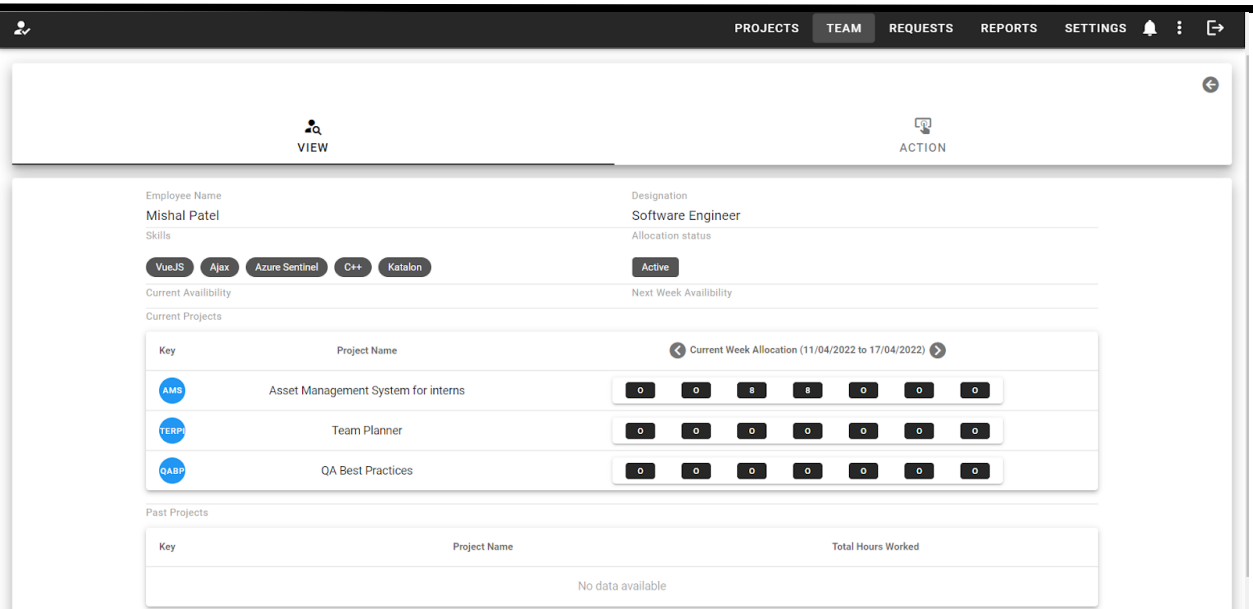


Fig. 5.3.6 - View Employee.

As you can see in the above image the user can look in detail for the employee regarding the allocations in any or all projects with the employees designation, skills and allocated status.

5.4 Requests Module

The request module has the details for any or all requests created for employees and can also be used to create new requests.

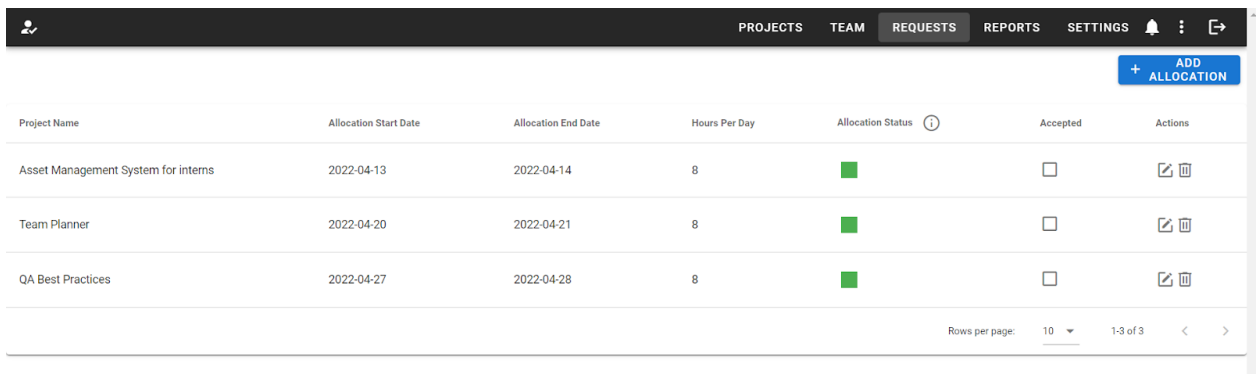


Fig. 5.4.1 - Requests Module.

The Request Tab by default looks like the above image. It contains the Project Name, Allocation start and end date, allocated hours per day, allocation status, and whether the request is accepted or not.

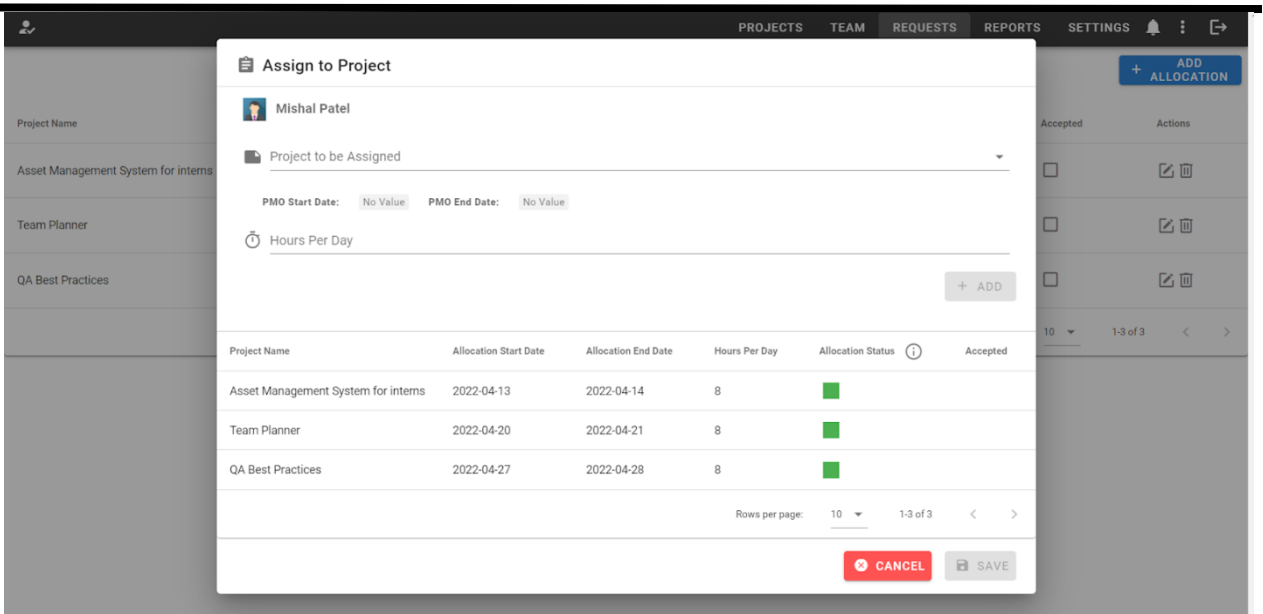


Fig. 5.4.2 - Add Allocations.

As you can see in the above image, the add allocation screen is used to create requests for any resource's allocation.

5.5 Report Module

The Report Module is used to create reports in for of charts for any or all kinds of analysis required by the PMO/PM for understanding the needs for future projects.



Fig. 5.5.1 - Report Module - 1.

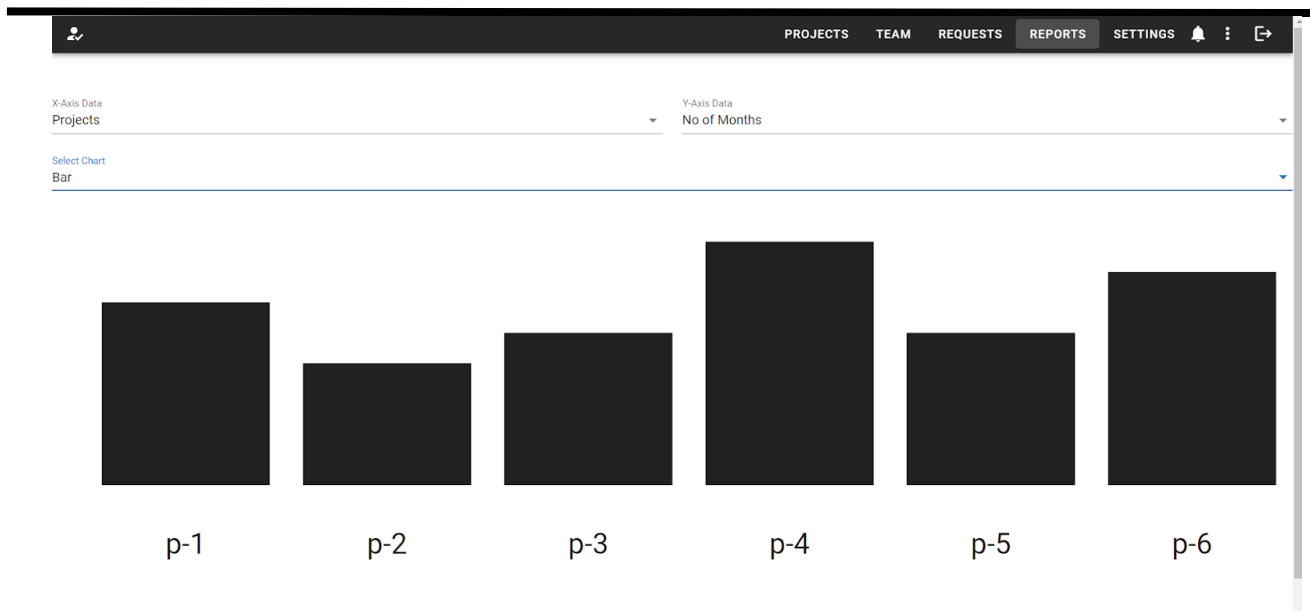


Fig. 5.5.2 - Report Module - 2.

The reports can be generated dynamically as you can see in the above images. The to select what to have on x-axis and y-axis is provided and also what type of chart is required can also be changed based on the needs of the user.

5.6 Settings Module.

The Settings module contains the syncing options for HRMS and JIRA servers. Users can either do the syncing process manually or can also set it to be done automatically.

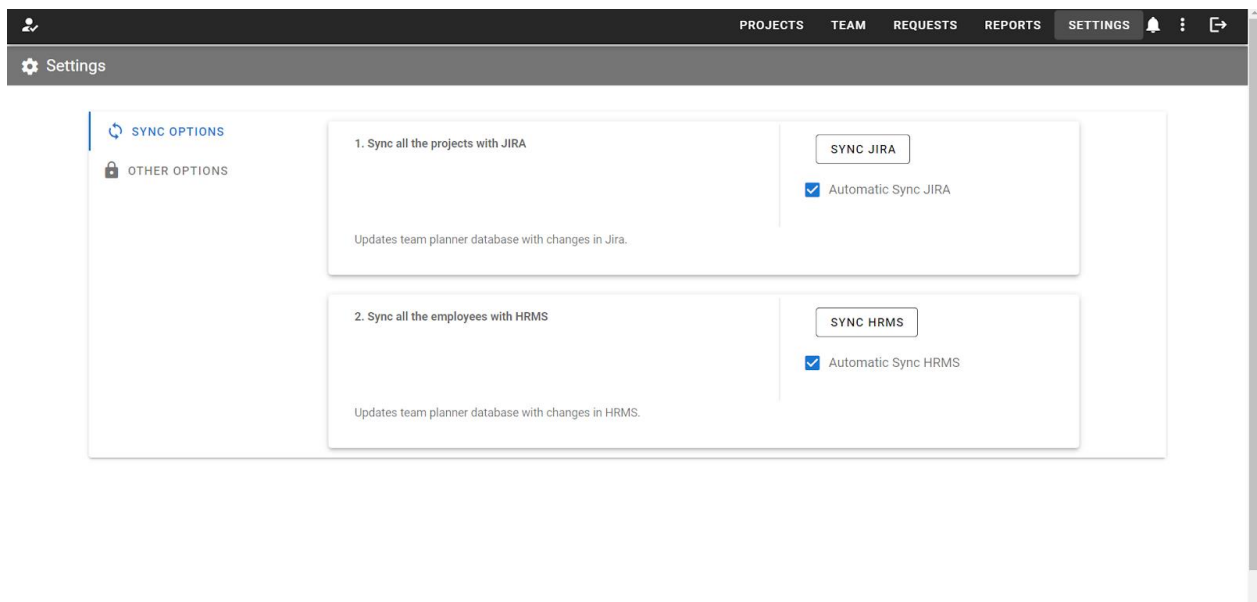


Fig. 5.6.1 - Settings Module.

As you can see in the above image, users can keep the syncing process automatically by clicking on the check box or can do it manually by clicking the Sync JIRA and Sync HRMS buttons.

5.7 Logout

After using the system how the user wants to, the user can log out form the system by clicking the logout icon provided on the top right corner of the screen.

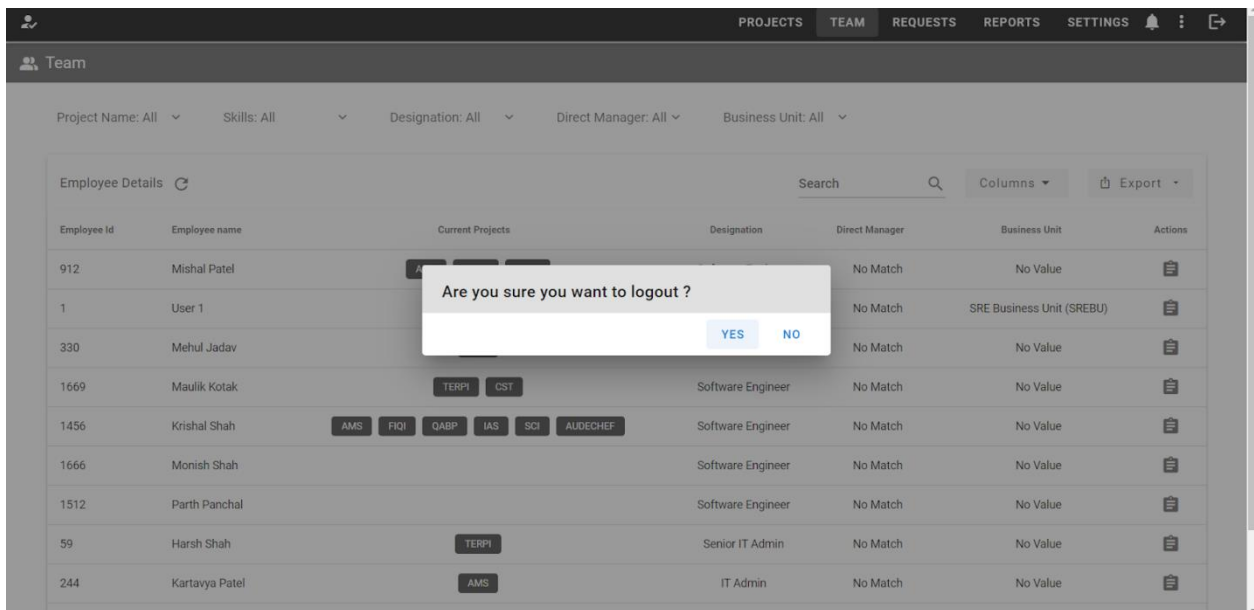


Fig. 5.7.1 - Logout.

As you can see in the above image after clicking the logout icon the user gets an alert notification to make sure the user is willingly logging out of the system.

6. Conclusion

The project's major goal was to create an easy-to-use solution for PMs and PMOs to allocate resources and plan teams for any upcoming or existing projects. Currently, the PM and PMO in any organization utilize an excel sheet to make the appropriate allocations, which is time consuming and exhausting because they must manually check the resource's availability and modify the length based on the resource's current allocation. This tool will reduce the time and effort required by PMs and PMOs to form a team for any project or even to alter an existing team.

This tool can be considered a basic requirement for any organization looking to speed up the process of forming and managing teams for several projects at once while lowering the amount of human effort required.

7. References

7.1 References

[1] Dimitra Chasanidou, Brian Elvesæter, Arne-Jørgen Berre - Enabling team collaboration with task management tools. Opensym16: August, 2016

[2] Martin JEppler, OliverSukowski - Managing team knowledge: core processes, tools and enabling factors. European Management Journal Volume 18, Issue 3, June 2000

[3] Hai Eric Lam, Piyush Kumar Maheshwari - Task and team management in the Distributed Software Project Management Tool. COMPSAC: October, 2001

7.2 Other Supplementary references

[4] <https://www.crestdatasys.com/about-us/>

[5] <https://012.vuejs.org/guide/>

[6] <https://www.geeksforgeeks.org/python-programming-language/>

[7] <https://fastapi.tiangolo.com/>

[8] <https://www.sqlalchemy.org/>

[9] <https://www.postgresql.org/about/>

Date: 25/09/2021

Ms.Bhumi Raval

Sub: Letter of Offer

Dear Bhumi Raval ,

Thank you for exploring career opportunities with Zignuts Technolab Pvt. Ltd. You have successfully completed our initial selection process and we are pleased to make you an offer.

This offer is based on your profile and performance in the selection process. You have been selected for the position of **Trainee-Web Developer**. Your Salary, including all benefits, will be Rs. 2,50,000/- Per Year, as per the terms and conditions set out herein. The gross salary mentioned above is inclusive of all the Variable Allowance.

You will be on a Service agreement for two years (Including Training).

Your Training cum Probation Period would be six months which would be effective from your date of joining. Your employment's confirmation would be based on your performance.As a part of training in the first six months, there will be a stipend of **Rs. 10,000/per month**.

Kindly confirm your acceptance of this offer by proposing your **Date of Joining**(Zignuts Technolab preferred to join us as early as possible). On joining and successful completion of joining formalities, you will be issued a Letter of Appointment by Zignuts Technolab Pvt. Ltd.

Thanks & Regards,

Sagar Bhayani,

HR Manager.



Schedule I - Compensation Details

Basic Salary	10,417
Home Rent Allowance	4,167
Medical Allowance	2,083
conveyance allowance	2,083
Performance incentive	2,083
CTC(Monthly)	20,833 Rs.
CTC(Annually)	2,50,000 Rs.

* Professional Tax, TDS Any Other Applicable Taxes Inclusive

Kindly find the list of documents that need to be couriered on or before 27th Sept 2021 by 5 pm.

- Aadhar Card
- PAN Card
- Photograph(2 copy)
- Xerox copies of 10th Std,12th Std and last two semesters marksheet
- Any other certificates (Certificate Course or Diplomas)
- Details of your Bank Account
- 1 cheque of Rs. 1,00,000 (with signature)(For Security Purpose)
- Signed Service agreement



CIN: U72200GJ2012PTC072875

Web: www.zignuts.com

Email: hello@zignuts.com

Address: Zignuts Technolab Pvt Ltd, A-409 Siddhraj Zori, Near Saragasan Circle, S.G. Road,
Gandhinagar, India-382421

Expense Manager

A Project Report Submitted by

BHUMI RAVAL – 91800133035

**In partial fulfillment for the award of the degree of
Bachelor of Technology**

In

Information and Communication Technology



**Marwadi
University**

Faculty of Technology

Marwadi University, Rajkot

2021-22

CERTIFICATE


This is to certify that research/project work embodied in this dissertation titled "Expense Manager" was carried out by **Bhumi Raval(91800133035)** at **Marwadi University** for partial fulfillment of **B.Tech in Information and Communication Technology** to be awarded by Marwadi University. This research/project work has been carried out under my guidance and supervision and it is up to my satisfaction.

Date: 28/04/2022

Place: Marwadi University



Prof. Kapil Shukla
(Project Guide)



Prof. Chandrasinh Parmar
(Head of Department)

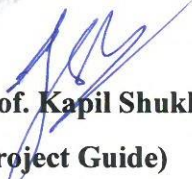
COMPLIANCE CERTIFICATE

This is to certify that research/project work embodied in this dissertation titled "Expense Manager" was carried out by **Bhumi Raval(91800133035)** at Marwadi University for partial fulfillment B.Tech to be awarded by Marwadi University. He/ She has complied to the comments given during Review I, Review II, Review III,..... by Reviewer to my satisfaction.

Date: 28/04/2022

Place: Marwadi University


Bhumi Raval
(91800133035)


Prof. Kapil Shukla
(Project Guide)

THESIS/PROJECT APPROVAL

This is to certify that research/project work embodied in this dissertation titled "Expense Manager" was carried out by **Bhumi Raval (91800133035)** at Marwadi University is approved for the B.Tech in Information and Communication Technology by Marwadi University.

Date: 28/04/2022

Place: Marwadi University

Examiner's Sign and Name:

Prof. Kapil Shukla



DECLARATION OF ORIGINALITY **CERTIFICATE**

We hereby certify that we are the sole authors of this thesis/project work and that neither any part of this thesis nor the whole of the thesis has been submitted for a degree to any other University or Institution.

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Date:


Bhumi Raval

(91800133035)


Prof. Kapil Shukla

(Project Guide)

Acknowledgments

I take this opportunity to express my deepest gratitude and appreciation to all those people who made this project work easier with words of encouragement, motivation and helped me towards the successful completion of this project work.

First I would like to express my sincere gratitude to My project guide Prof. Kapil Shukla for giving continuous support, Prof. Chandrasinh Parmar, Head Of The Department of Information and Communication Technology, At Marwadi University for his insightful advice, motivating suggestions, invaluable guidance, help and lots of moral support in the successful completion of this Project and also for his constant encouragement and advice throughout my B.Tech. (Information And Communication Technology) program.

I would like to thank all other teaching staff for their valuable teaching and constant advice which made me finish this program successfully.

Finally, my deepest gratitude goes to my parents who have given me much-needed comfort, support, encouragement, and inspiration for completing this project.

Date: 28/04/2022

Bhumi Raval (91800133035)

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Institute's Vision and Mission

Institute's Vision

Our vision is to address challenges facing our society and planet through sterile education that builds capacity of our students and empower them through their innovative thinking practice and character building that will ultimately manifest to boost creativity and responsibility utilizing the limited natural resources to meet the challenges of the 21st century.

Institute's Mission

- To Produce creative, responsible and informed professionals
- To produce individuals who are digital-age literates, inventive thinkers, effective communicators and highly productive.
- To deliver cost-effective quality education
- To offer world-class, cross-disciplinary education in strategic sectors of economy though well devised and synchronized delivery structure and system, designed to tackle the creative intelligence and enhance the productivity of individuals.
- To provide a conducive environment that enables and promotes individuals to creatively interact, coordinate, disseminate and examine change, opinion as well as concept that will enable students to experience higher level of learning acquired through ceaseless effort that lead to the development of character, confidence, values and technical skills.

Department's Vision and Mission

Department's Vision

To impart quality technical education through research, innovation and teamwork for creating professionally superior and ethically strong manpower that meet the global challenges of engineering industries and research organization in the area of Computer Engineering.

Department's Mission

- Maintain a vital, state-of-the art ICT enabled teaching and learning methodologies, which provides its students and faculty with opportunities to create, interpret, apply and disseminate knowledge.
- Enable graduates in becoming digital age literates, innovators, efficient communicators and result oriented professionals.
- Dedicate itself to providing its students with the skills, knowledge and attitudes that will allow its graduates to succeed as engineers, leaders, professionals and entrepreneurs.
- Prepare its graduates for life-long learning to meet intellectual, ethical and career challenges.
- Inspire graduates for competitive exam higher education as well as research and development.

PEO, PO and PSO

Program Educational Objectives (PEO):

Our graduated students are expected to fulfill the following Program Educational Objectives (PEOs):

1. **Core Competency:** Successfully apply fundamental mathematical, scientific, and engineering principles in formulating and solving engineering and real life problems for betterment of society.
 2. **Breadth:** Will apply current industry accepted practices, new and emerging technologies to analyse, design, implement and maintain state of art solutions.
 3. **Professionalism:** Work effectively and ethically in ever changing global professional environment and multi-disciplinary environment.
 4. **Learning Environment:** Demonstrate excellent communication and soft skills to fulfil their commitment towards social responsibilities and foster life-long learning.
 5. **Preparation:** Promote research and patenting to enhance technical and entrepreneurship skills within them.
- Function and communicate effectively to solve technical problems.
 - Advance professionally to roles of greater computer engineering responsibilities, and/or by transitioning into leadership position in various industries such as business, government, and/or education.
 - Prepare for entrepreneurship skills by demonstrating commitment to community by applying technical skills and knowledge to support various service activities.
 - Place themselves in positions of leadership and responsibility within an organization and progress through advanced degree or certificate programs in engineering, business, and other professionally related fields.
 - Participate in higher study by the process of life-long learning through the successful completion of advanced degrees, continuing education, and/or engineering certification(s)/licensure or other professional development.

Program Outcomes (POs)

Engineering Graduates will be able to:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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List of Symbols, Abbreviations and Nomenclature

Symbol	Abbreviations
WWW	World Wide Web

1. Introduction

1.1 Introduction

In today's busy and hectic life we all are rushed towards making money and run too much in daily life to create money but at the end of month will break off. As we are unknowingly spending money on little and unwanted things. So, we have come over with the idea to track our earnings. Expense Manager aims to help everyone who are planning to know their expenses and save from it. Expense Manager is an website which users can execute in their Web and update their daily expenses so that they are well known to their expenses. It will help to perform different transactions operations. This website is focused on new job holders, interns and teenagers, everyone who wants to track their expense can use this app.

1.2 Definition

We are developing a web application named as "Expense Manager" and this web application is used to manage the user's daily expenses in a more efficient and manageable way. By using this web application we can reduce the manual calculations for their daily expenses and keep the track of the expenditure. This Application is being made using technologies like JS, MongoDB, and some Frontend Technologies. In this application, user can provide his income to calculate his total expenses per day and these results will be stored for unique user. This web application allows users to maintain a digital automated diary. Here Each user will be required to register on the system at registration time.

1.3 Scope

The main Scope of this can be the Any age group person including students, or any job oriented person can use this project. There is no any age restriction if anyone know basic computer skills then they can definitely they can use this.

1.4 Objectives

Main Purpose behind this project is to make peoples life easy by managing their most stressed part of life that is of expense management and make them feel less stressed by providing such application which will help them to manage their expense and let them enjoy their work without feeling stressed.ad also this project will be too much user-friendly any one can use it if they know how to access basic websites.

1.5 Problem Specification

There are many other systems are also available in market but as per our research we find mostof the existing system have to face this type of issues:

- Current system need to carry books every where
- Carrying books feels insecure some times
- Maintaining total daily spent
- Management of daily record
- Not possible to remember all small small spends

To overcome the above-mentioned problems, we have implemented “Expense Manager” that can give you user-friendly and network-friendly access.

2. Project Management

2.1 Project Planning

The software project management process begins with the set of activities that are collectively called project planning. The objective of software project planning is to provide a framework that enables the administrator to make reasonable estimates of resources, cost, and schedule.

Task	From Date	To Date
Functionality	03/1/2022	08/1/2022
Functionality Description	09/1/2022	13/1/2022
Screen shots	15/1/2022	23/1/2022
Data Dictionary	25/1/2022	06/02/2022
UML Diagram	08/02/2022	11/02/2022
UML Diagram & E-R Diagram	13/02/2022	25/02/2022
Implementation	25/03/2022	08/03/2022
Final Report	10/04/2022	20/04/2022

Table 2.1 Project Planning

2.2 Project Scheduling

The following table outlines the tasks that need to be completed for each phase and the students who are responsible for those tasks.

Task List	Members
Planning	Bhumi Raval
Implementation	Bhumi Raval

Design Functionality on paper	Bhumi Raval
Plan API implementation	Bhumi Raval
Design Functionality Description	Bhumi Raval
Made Functionality Description in doc	Bhumi Raval
Design Screen Shots on paper	Bhumi Raval
Made Screen Shots in html & Visual Studio	Bhumi Raval
Design Data Dictionary on Paper	Bhumi Raval
Made Data Dictionary in doc	Bhumi Raval
Design UML & E-R Diagram on paper	Bhumi Raval
Made UML & E-R Diagram in gliffy.com & diagram.ly	Bhumi Raval
Implementation APIs and Validation	Bhumi Raval
Implementation of all functionality with cross validation	Bhumi Raval

Table 2.2 Scheduling

3. System Requirements Study

3.1 User Characteristic

• Authorized User

Authorized user has access to use bellowed mentioned functionality:

- Add New Member:
 - Add new Member details.
- Update Member:
 - Add new member and information related to the member and manage member Information.
- Delete Member:
 - Delete new member and information related to the member and manage member Information.
- Manage Transactions:
 - Add,Update,Delete transactions and maintain proper record for the same.
- Transfer Fund:
 - Transfer fund to different accounts which is linked to your account.

3.2 Hardware and Software RequirementSpecification

This shows minimum requirements to carry on to run this system efficiently.

3.2.1 Hardware

- Processor: Pentium P4, processor 2 GHz
- RAM: 512 MB RAM
- Hard Disk: 20 GB HDD
- Mouse: Optical or compatible pointingdevice.
- Keyboard: Any Keyboard.

Monitor: Any Display monitor with 1024*768 Resolution

3.2.2 Software

- Operating System: Any windows based operating system
- Tool: Visual Studio 2022 Swagger (API Documentation)
- Database: SQL Server

4. System Analysis

4.1 Features of New System

The project “Expense Manager” includes features mentioned below:

- Managing users with add, update, delete, and search features
- Managing transactions with add, update, delete, and search features
- Makes it easy to display all account details
- Display different transactions
- Regular monitoring for database through admin site

Pages:

1. Features

There is 2 Login.

- Client side
- Admin side

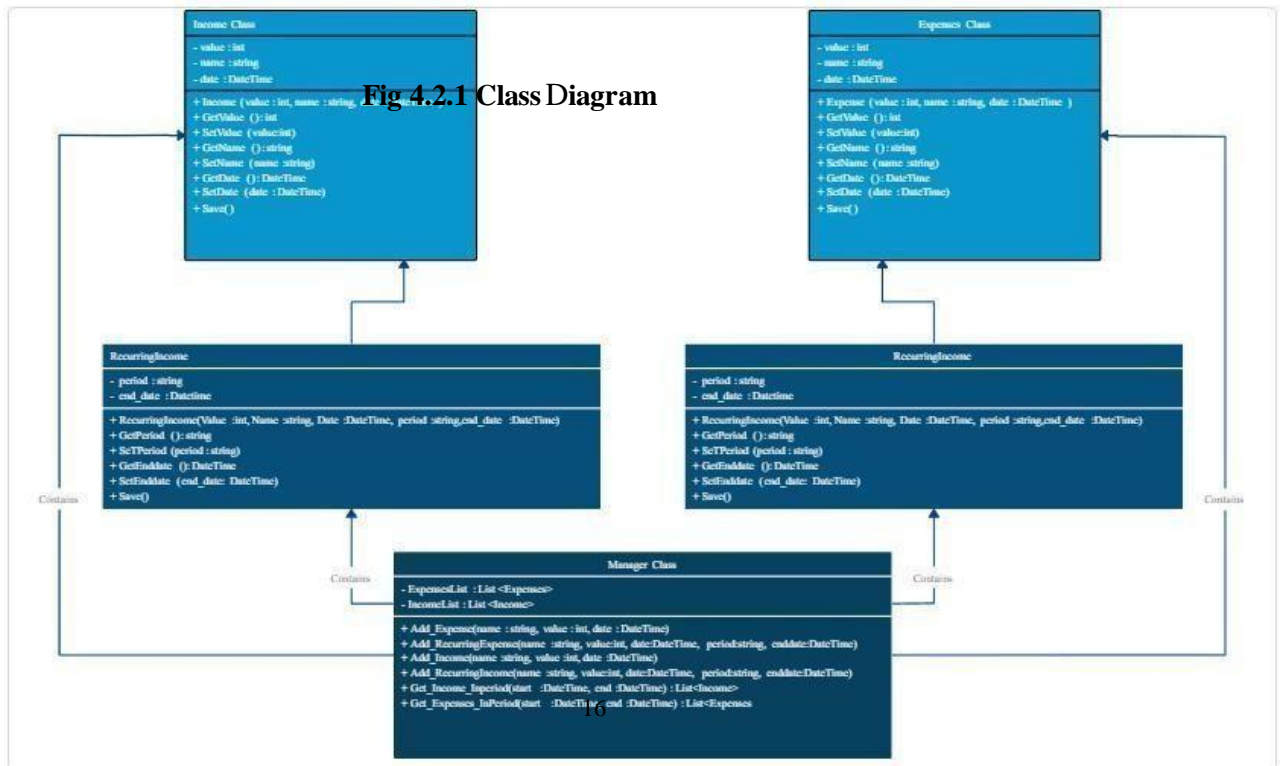
2. Features for Client

- a. Find Direct Donor
- b. Add Account
- c. Delete Account
- d. Update Account
- e. Add Transaction
- f. Delete Transaction
- g. Update Transaction
- h. Transfer Money

4.2 UML Diagrams

4.2.1 Class Diagram

- The illustration shown in this article gives you the hint on how will you design your own System UML Class Diagram. It has the simple idea on how the class Diagram works.



4.2.2 Sequence Diagram

- This is the UML sequence diagram of Expense Management System which shows the interaction between the objects of expense, accounts, income, database.

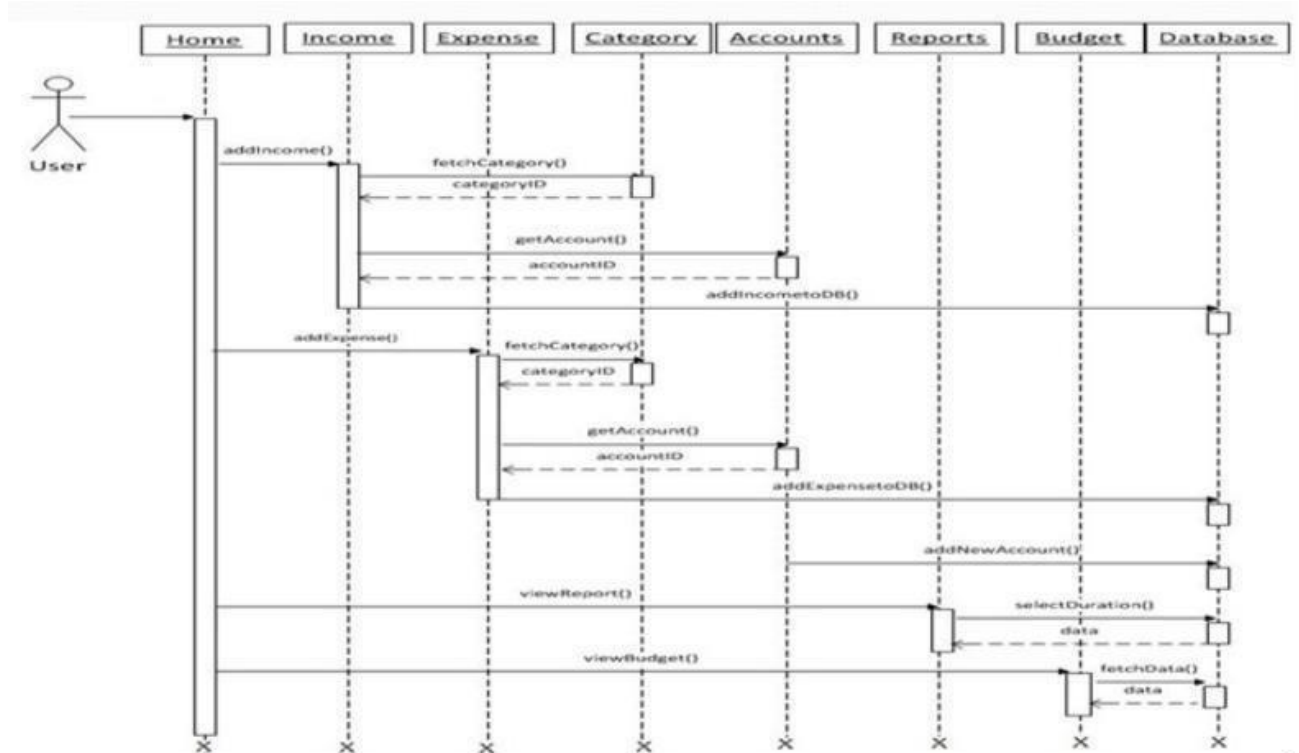


Fig 4.2.2 Sequence Diagram

4.2.3 Activity Diagram

- This is the Activity UML diagram of Expense Management System which shows the flows between the activity of transactions and expenses.

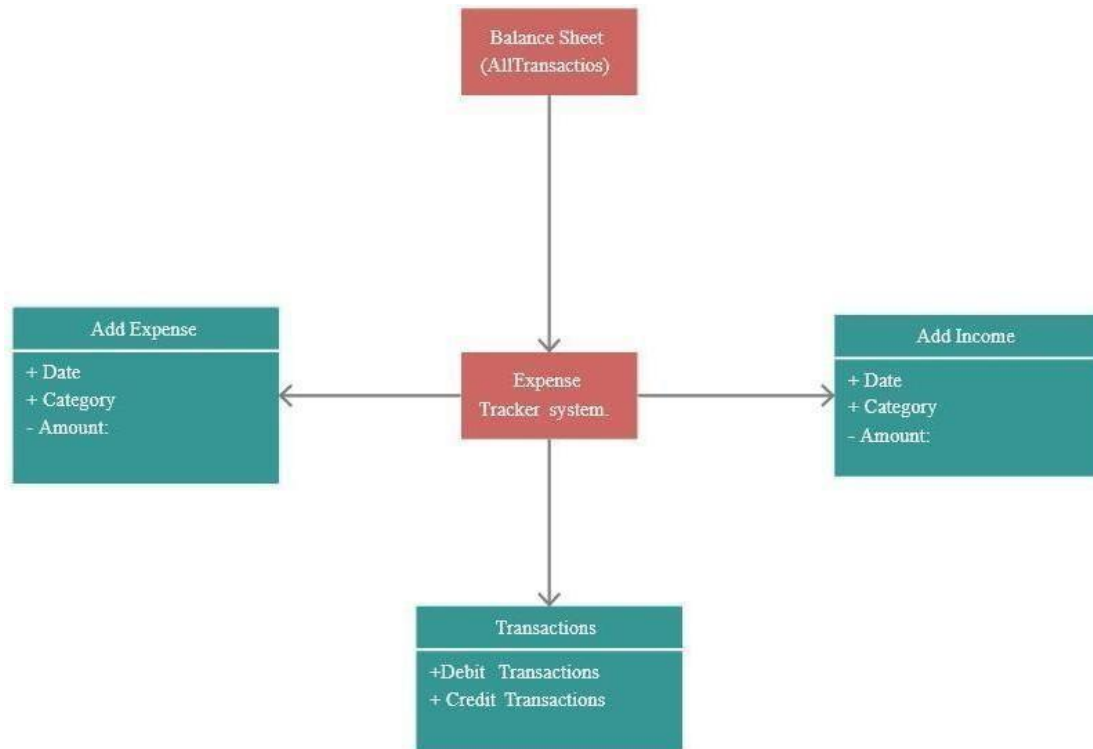


Fig 4.2.3 Activity Diagram

4.2.4 Use-Case Diagram

- This is the Use-Case diagram of Expense Management System which shows the flows between the activity of accounts.

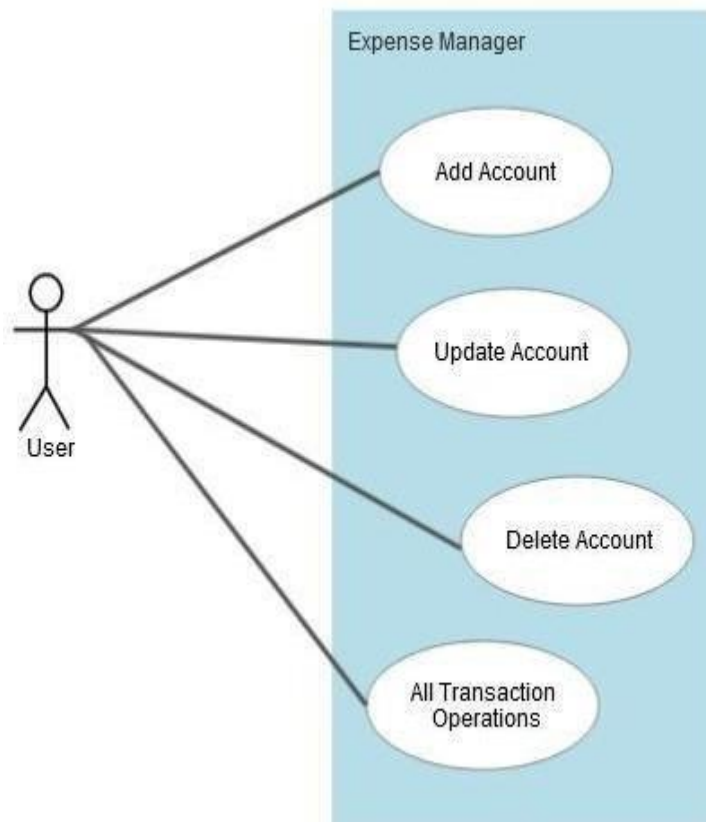


Fig. 4.2.4 Use-Case Diagram

5. System Design & Implementation

5.1 Front-End Side Implementation

➤ **Website view :**

This is front page of website when someone just search name on google they will find this as result of upcoming URL Request.

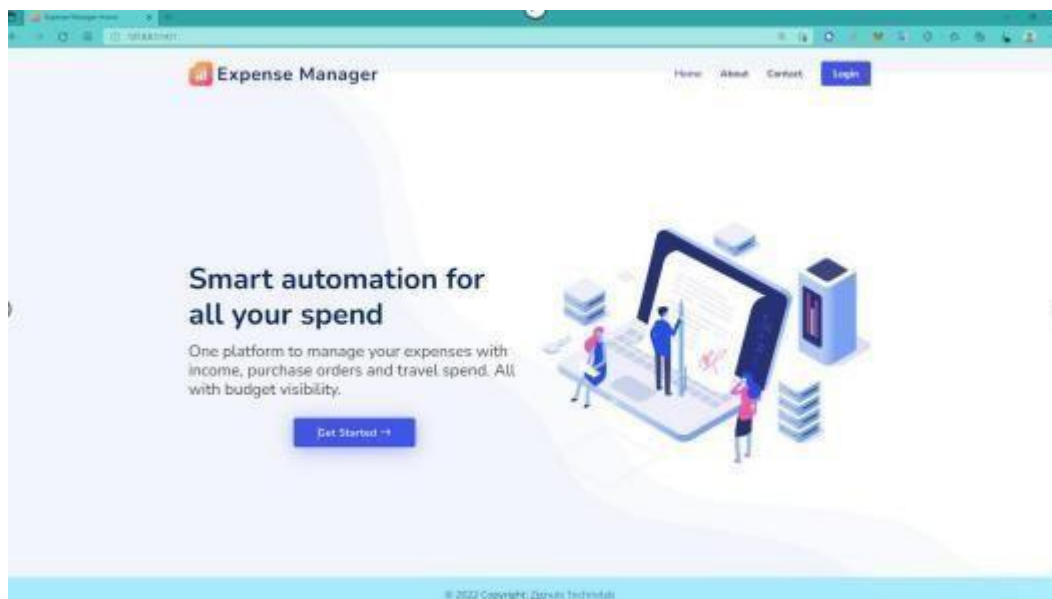


Fig 5.1.1 Website view

➤ **Sign Up :**

This is SignUp page which does required correct mailId, Password, UserName to SignUp in Website.

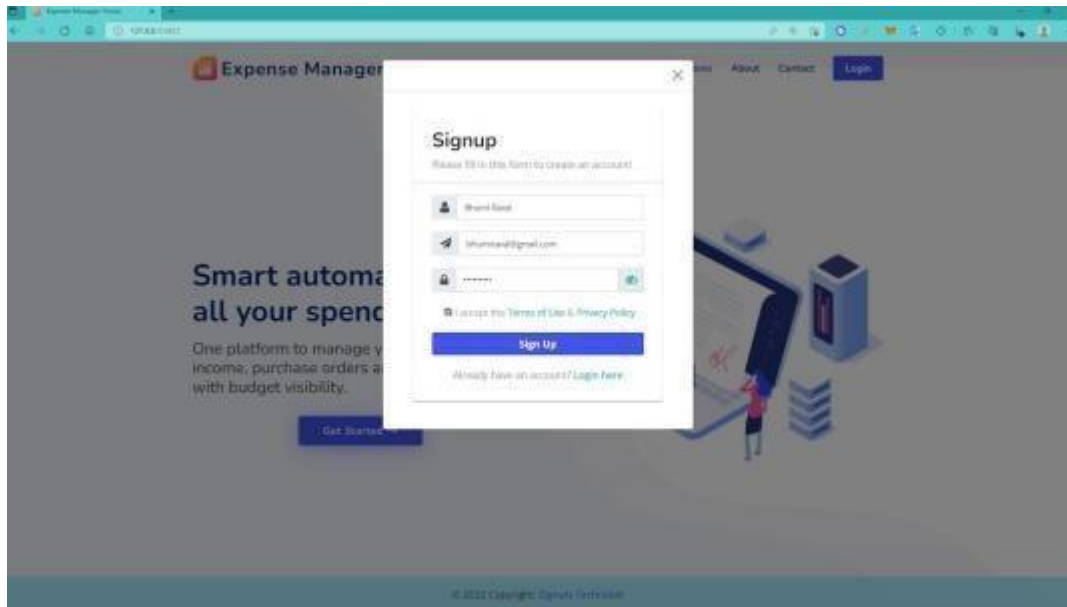


Fig 5.1.2 Sign up

➤ **Login :**

This is login page of website which needs correct mailId and password to login.

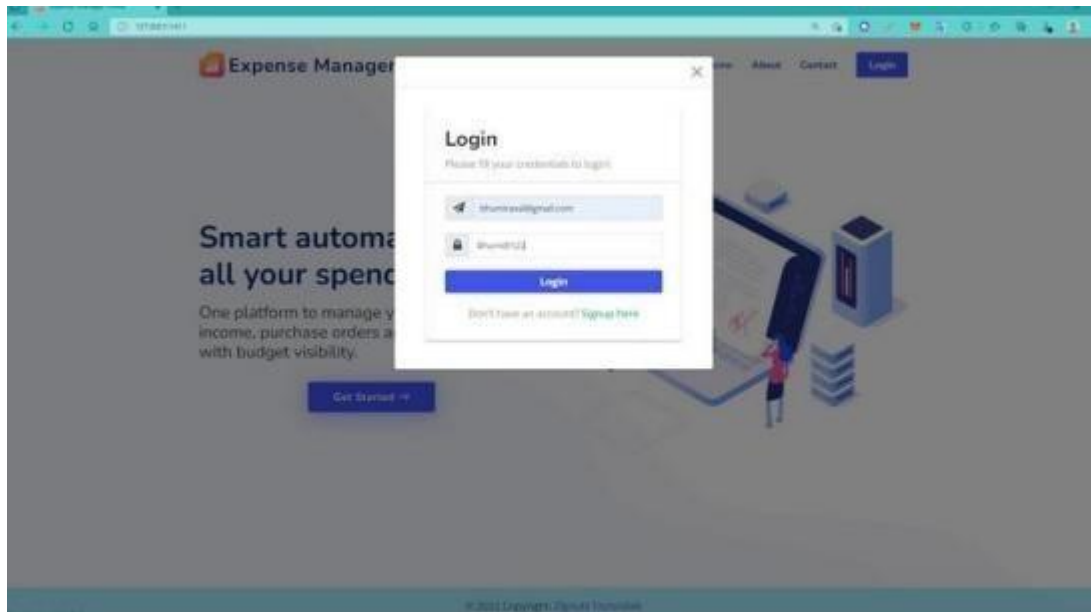


Fig 5.1.3 Login

➤ **Add Member:**

This One can add new member to connect with their account and send or receive money from one account member to another.

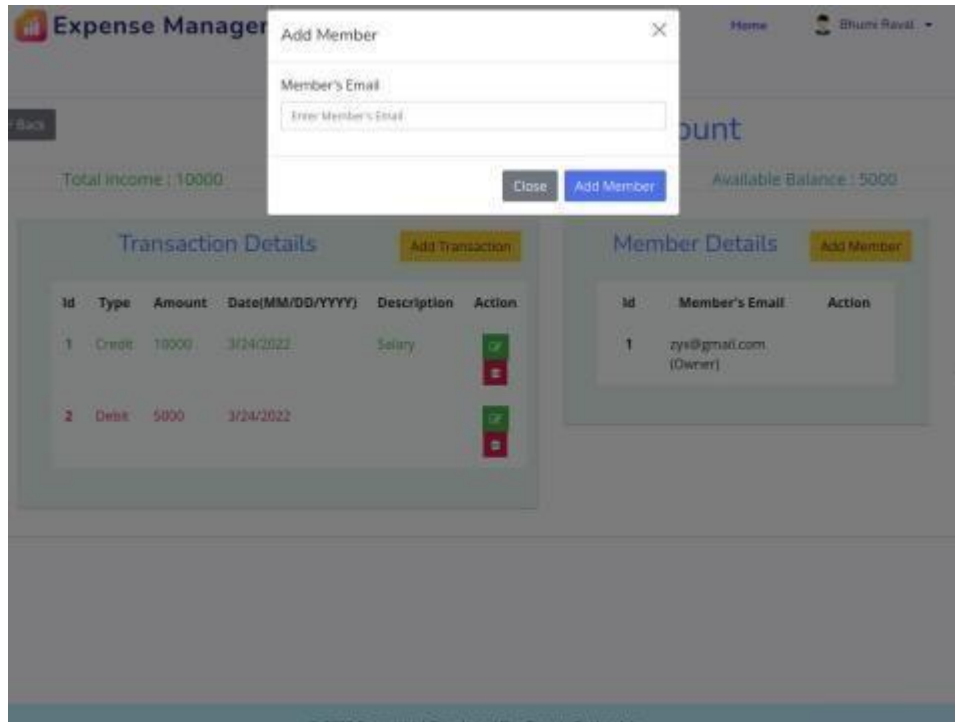


Fig 5.1.4 Add member

➤ **Update Member :**

Here one can update their account details by adding the new details from given options.

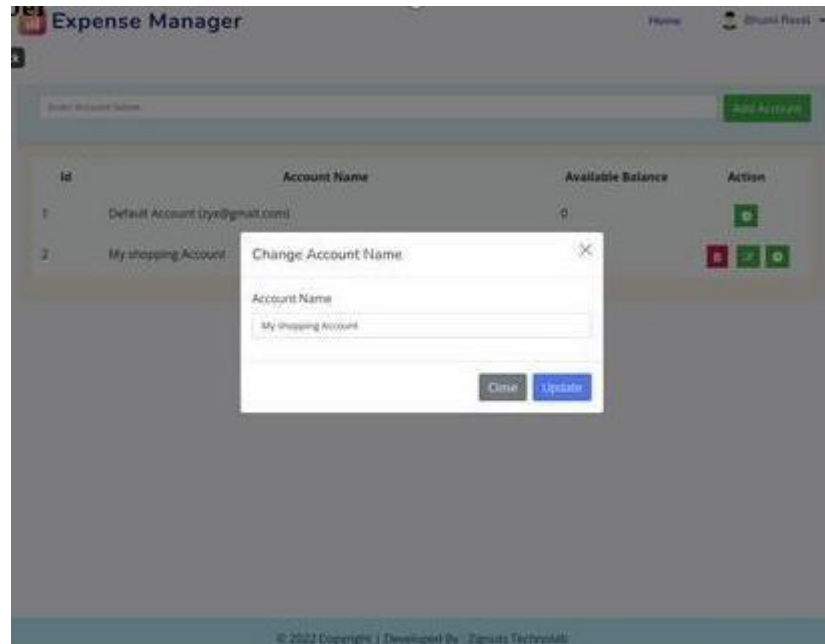


Fig 5.1.5 Update Member

➤ **Add transactions:**

This functionality is main feature of website one can add new transaction like transferring money to another account by just adding their account number.

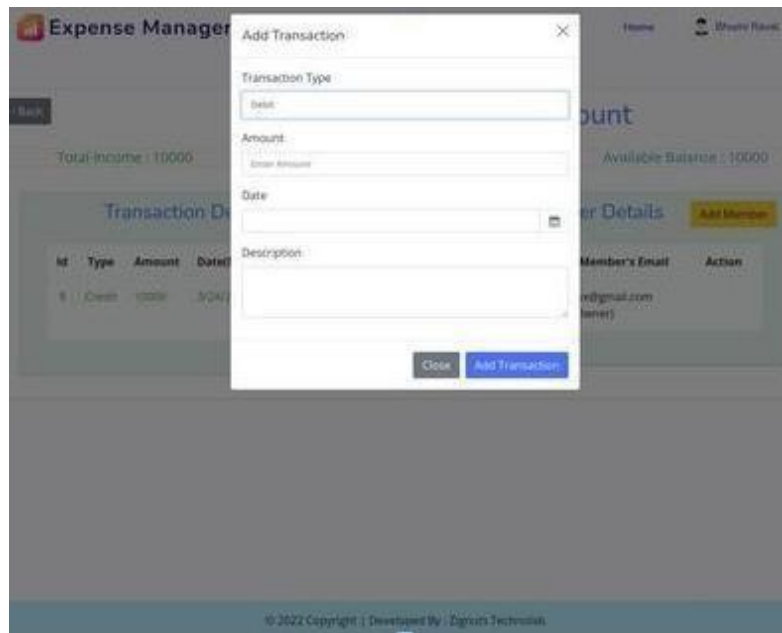


Fig 5.1.6 Add transactions

➤ **Transaction view:**

Here one can see the history of transaction along with member details also and can add or update new members also.

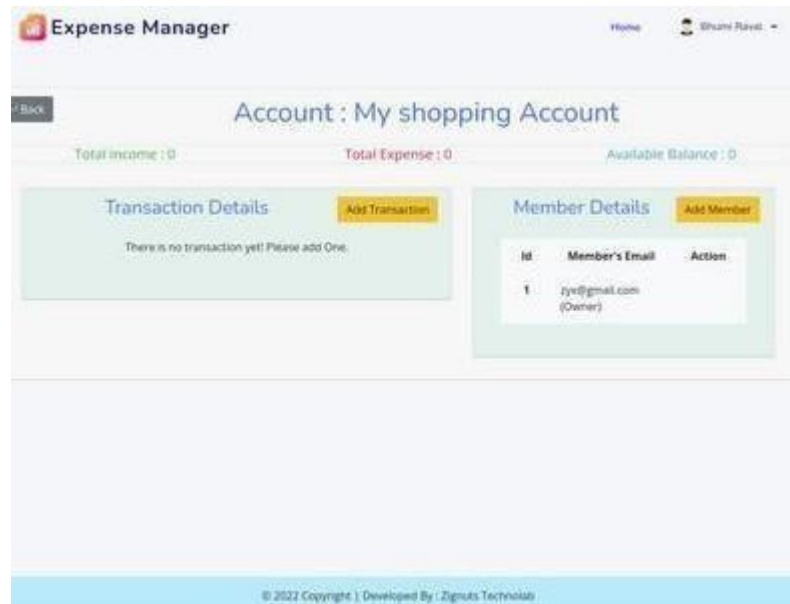


Fig 5.1.7 Transaction view

➤ **Delete Transaction:**

This is functionality which gives feature to delete the transaction and along with their member details also and keep history updated.

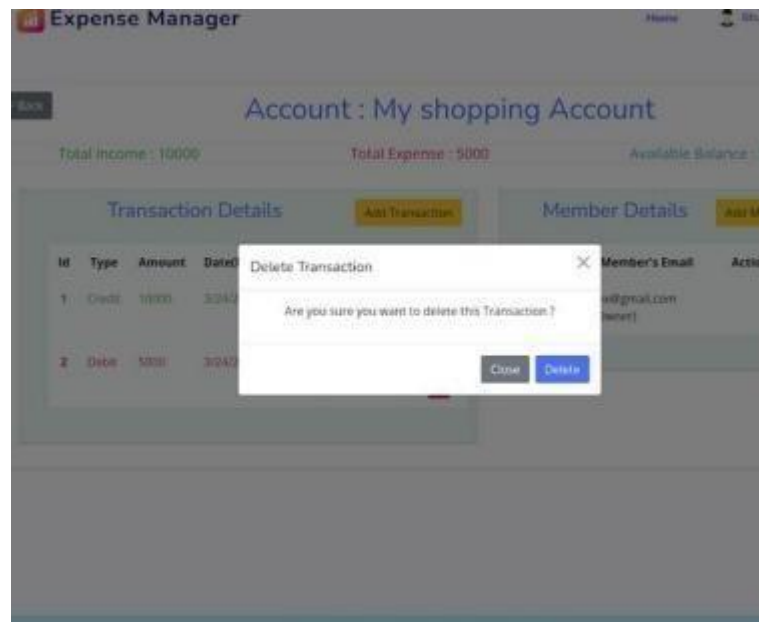


Fig 5.1.8 Delete transaction

➤ **Update Transaction:**

This feature keep the old transaction details updated along with history of member details and account details.

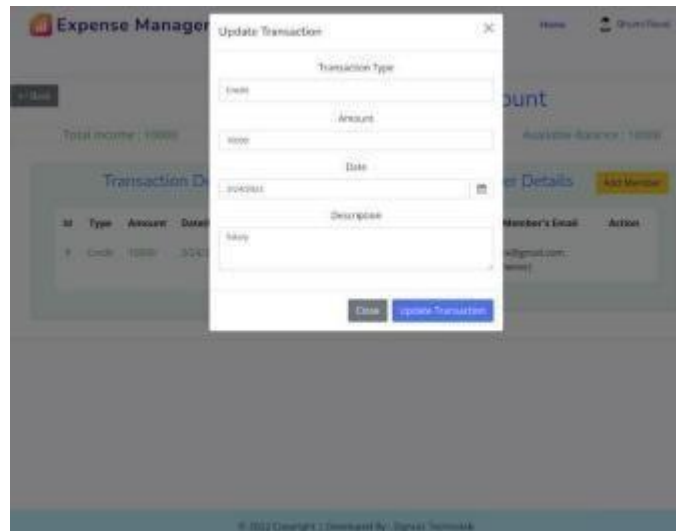


Fig 5.1.9 Update transaction

➤ Testings

● Testing Plan

The goal of test plan is to include all the details related to testing such as what to test, when to test, how to test and who will be the tester. Test plan is updated but if there is some new feature or change is introduced then it has to be updated accordingly.

● Testing Methods

Branch Testing: Each branch of application that is corporate dealing solution is working correctly and navigation take place easily.

System Work Performance Testing: System work performance testing is done by many users for appropriate working of application and to remove problem will may possibly face by user.

● Limitation of this system

There is only one limitation that system is currently not able to link bank account directly if it will be possible then we directly merge the statement with application and find all the user data.

➤ **Project development**

Project Development Approach Agile:

Agile model believes that every project needs to be handled differently and the existing methods need to be tailored to best suit the project requirements. In Agile, the tasks are divided to time boxes (small time frames) to deliver specific features for a release.

Advantage of Agile model:

- Customer satisfaction by rapid, continuous delivery of useful Web portal Updates.
- People and interactions are emphasized rather than process and tools. Customers, developers and testers constantly interact with each other.
- Working web portal updates will be delivered frequently (weeks rather than months).
- Close, daily cooperation between investors publishers and developers.
- Continuous attention to technical excellence and good design.
- Regular adaptation to changing circumstances, Graphics API, Engines.
- Late changes in requirements will be accommodate

➤ **Input/output and Interface Design**

Samples of interface

User interface needs keyboard and mouse if they are using the laptop or the desktop by using these they can Register them self in website and starting doing all the activities easily without any problem.

Access Control and security

Security access control is an important aspect of any system. Security access control is the act of ensuring that an authenticated user accesses only what they are authorized to and no more. The bad news is that security is rarely at the top of people's lists, although mention terms such as data confidentiality, sensitivity, and ownership and they quickly become interested. The good news is that there is a wide range of techniques that you can apply to help secure access to your system.

6. Conclusion

6.1 Conclusion:

The portal is developed with complete pre-planning and designing of all the modules with set of guidelines and report for deciding the need and necessity of the required module enlist by users of the system. This portal is available for all those who need easiness in hectic daily life by managing their daily expenses using this kind of applications

6.2 References:

- [API Documentation & Design Tools for Teams | Swagger](#)
- <https://sailsjs.com/documentation/concepts>
- <http://www.stackoverflow.com>
- [Argon Dashboard - Free Dashboard for Bootstrap 4 \(creative-tim.com\)](#)
- <http://www.javatpoint.com>
- <http://www.codeproject.com>

Confirmation Letter

Date: 14/12/2022

Name: Rucha Khakhkhar

In recognition of your services and performance towards our Company, we are happy to confirm your employment as “Site Reliability Engineer” with effect from 25/11/2022.

Furthermore, we would like to inform you that the same will be in line with the terms and conditions as agreed by you in the employment agreement.

Looking forward to a bright future with Crest Data Systems.

Thanks,

Neha Shah

Neha Shah

Director, Crest Data Systems

Rucha Khakhkhar

Employee Signature

Rucha Khakhkhar



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IP: 12.26.0.38		

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By

Rucha Khakhkhar - 91800133011

Guided By

Prof. Krupali Rana

A Thesis Submitted to

Marwadi University in complete Fulfillment of the Requirements for the Bachelors of
Technology in Information Communication and Technology

April, 2022



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Rajkot-Morbi Road, At & Po. Gauridad,

Rajkot-360003, Gujarat, India.

CERTIFICATE

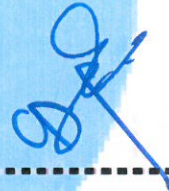
This is to certify that research/project work embodied in this dissertation titled “**Splunk Distributed Architecture**” was carried out by **Rucha Khakhkhar** at **Marwadi University** for complete fulfillment of **Bachelors of Technology in Information Communication & Technology** to be awarded by Marwadi University. This research/project work has been carried out under my guidance and supervision and it is up to my satisfaction.

Date: 29/04/2022

Place: Marwadi University



Prof. Krupali Rana



Prof. Chandrasinh Parmar

Seal of Institute

COMPLIANCE CERTIFICATE

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Date : 29/04/2022

Place : Marwadi University



Rucha Khakhkhar

91800133011



Prof. Arjav Bavarva

THESIS/PROJECT APPROVAL CERTIFICATE

This is to certify that research/project work embodied in this dissertation titled “Splunk Distributed Architecture” was carried out by **Rucha Khakhkhar 91800133011** at **Marwadi University** is approved for the **Bachelors of Technology in Information Communication and Technology** by Marwadi University.

Date : 29/04/2022

Place : marwadi university

Examiner's Sign and Name:



Prof. Arjav Bavarva



Prof. Dharmendrasinh Zala

UNDERTAKING ABOUT ORIGINALITY OF WORK

We hereby certify that we are the sole authors of this thesis/project work and that neither any part of this thesis nor the whole of the thesis has been submitted for a degree to any other University or Institution.

We certify that, to the best of our knowledge, the current thesis/project work does not infringe upon anyone's copyright nor violate any proprietary rights and that any ideas, techniques, quotations or any other material from the work of other people included in our thesis/project work, published or otherwise, are fully acknowledged in accordance with the standard referencing practices. Furthermore, to the extent that we have included copyrighted material that surpasses the boundary of fair dealing within the meaning of the Indian Copyright (Amendment) Act 2012, we certify that we have obtained a written permission from the copyright owner(s) to include such material(s) in the current thesis and have included copies of such copyright clearances to our appendix.

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Date : 29/04/2022



Rucha Khakhkhar

(91800133011)



Prof. Krupali Rana

ACKNOWLEDGEMENTS

I take this opportunity to express my deepest gratitude and appreciation to all those people who made this project work easier with words of encouragement, and motivation and helped me towards the successful completion of this project work.

First I might want to offer my earnest thanks to our task guide Prof. Krupali Rana for giving ceaseless help, Prof. C D Parmar, Head Of The Department of Information and Communication Technology, at Marwadi University for his clever exhortation, persuading ideas, priceless direction, help and loads of moral help in the effective finish of this Project and for his steady consolation and counsel all through my B.Tech. (Data And Communication Technology) program.

I might want to thank any remaining school personnel for their significant instructing and consistent exhortation which made me finish this program effectively.

At last, my most profound appreciation goes to my folks who have given me much-required solace, backing, consolation, and motivation for finishing this task.

Date:29/04/2022

Rucha Khakhkhar
(91800133011)

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ABSTRACT

We are well aware of the machine generated data in the current day scenario. To get out the meaningful insights from the machine generated data and monitor that data continuously such scenarios Splunk will be useful. Moreover it's tedious to deploy any application manually and it may also tend to cause human error. This project deals with deploying applications automatically and monitors its data using Splunk which is deployed in the same project.

COMPANY PROFILE

Crest Data Systems is a provider of custom solutions of Data Analytics, Cyber Security, DevOps, Cloud, and other Data Center Technologies. With a clientele that includes several Fortune 500 corporations as well as some of the hottest Silicon Valley Startups, Crest Data Systems strives to help customers build cutting-edge solutions that help them outperform their competition and stay ahead of the innovation curve.

In addition, we offer tools to develop technical expertise in technology areas including Cisco, VMware, AWS, Microsoft certifications. We encourage contributing to open-source projects and attending industry conferences. We continuously provide a platform to our engineers to be challenged professionally and guide them to shape a fulfilling career.

With diverse global experience in successful startups as well as working in global corporations, our team understands the meaning of “Enterprise Software” and the security, compliance, scale, and reliability metrics associated with the term. Putting the client’s needs first is ingrained in our DNA and we go through great lengths to ensure that we keep our reputation.

Our team has extensive experience in building and deploying technologies and solutions from Cisco, Splunk, Symantec, ElasticSearch, Moogsoft, NetApp, Dell-EMC, VMware, and several other such Global hi-tech Enterprises.

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1.Introduction

1.1 Purpose

The Purpose of Software Requirements Specification (SRS) is to provide a detailed description of the **Splunk Distributed Architecture**.

SRS will give a complete understanding of purpose and its functionality. This document helps developers to understand software correctly as well as it can be used as a software validation document for users.

1.2 Scope

Manually creating a server and configuring a website on it is a very tedious job. Moreover sometimes we even need to monitor our data for which we require the setup of a data analytics tool like Splunk which too is a tedious process to perform.

This process is very time consuming as well as erroneous because as there is a human hand involved, there is even a scope of error for sure and it is difficult to maintain consistency. Moreover, the process of creating servers to deploy websites again and again is tiresome which can be avoided by implementing automation.

The Terraform automation system will take care of this lengthy process to reduce the scope of error by automating this deployment and even after deployment management.

1.3 Definitions, Acronyms and Abbreviations

Instances: AWS EC2 instance means a VM (Virtual machine) provided by AWS. Here we are using Ubuntu VM

AWS: Amazon Web Services – cloud computing service

SH: Search-head (Part of Splunk architecture where we can get to access and search data)

IDX: Indexer (It is a part of Splunk architecture where all data are indexed)

FWD: Forwarder (Part of Splunk architecture which is setup at data generation machine to forward data to the Splunk system.)

SRE: Site Reliability Engineer is the user of the system whose work is to manage the cloud or on prime infrastructure.

1.4 Overview

The following sections of this document will focus on describing the system in terms of product, functionalities and dependencies, external interface requirements, functional requirements, performance requirements and another requirement.

2. About the System

2.1 System Introduction

To create and understand the whole system we require to get basic knowledge of five main technology

1. Splunk: Data monitoring tool.
2. AWS: Cloud platform to deploy Splunk and website.
3. Ansible: Automation tool to reduce manual efforts and by automating the deployment steps.
4. Terraform: Infrastructure building tool.
5. Jenkins: CI/CD tool to manage all the processes.

2.1.1 Splunk

Splunk is a tool which aims to squeeze the important information from unorganized machine data. Splunk provides easy and faster service to search and index the unorganized machine data.

Splunk has three main components:

1. **Search-Head:**

It is the console where all searching and visualization of data is being performed.

2. **Indexer:**

It indexes the data so Splunk searches it in a faster way. Basically, it is the instance where all data gets stored.

3. **Forwarder**

It is set up on a data generating machine. It will send data to indexers. The data sent by the forwarder is raw data which is not organized or structured.

Splunk provides highly scalable architecture to fulfill the giant need of searching and indexing terabytes of data. It provides clustering on search-head and indexers. Splunk Enterprise monitors and analyses machine data from any source to deliver Operational Intelligence to optimize your IT security and business performance. With instinctive reasoning features, machine intelligence, bundle requests and open APIs, Splunk Enterprise is a flexible policy that scales from concentrated use cases to an energy-wide data organization.

2.1.2 AWS

AWS means Amazon Web Services. It is a rental cloud computing platform which on spot provides elastic resources to fulfill our computing needs. With the computing resources, it also provides other services to manage the security and other stuff ^[5].

Some useful services provided by AWS ^[5]:

- 1. EC2:**
Elastic Cloud Computing, VM with customized hardware and software requirements.
- 2. S3:**
Static Storage Service to statically manage data
- 3. VPC:**
Virtual Private Cloud which is useful to manage cloud network
- 4. SG:**
Security group which is helpful in restricting the inbound and outbound traffic.

2.1.3 Ansible

Ansible is a automation and orchestration tool well known for its simplicity of installment, easy to use in what concerns the availability to clients, its absence of agent for ansible clients and the large number of skills.

Ansible capacities by connecting through SSH to the clients, so it doesn't need a special agent from the client-side, and by pushing modules to the clients. The modules are then executed locally, on the client-side, and the result is pushed back to the Ansible server.

Since it utilizes SSH, it can easily interface with clients utilizing SSH-Keys, simplifying through the entire process. Client information, namely hostnames or IP addresses and SSH ports, are put away in records called inventory files. Whenever you have made an inventory file and populated it, ansible can utilize it.

Ansible uses playbook to describe automation jobs, and playbooks utilize very simple language for example YAML (It's a human-readable information serialization language and is regularly utilized for arrangement documents, however could be utilized in numerous applications where data is being stored) which is very simple for people to get, read and compose. Henceforth the benefit is that even the IT foundation support team can read and get the playbook and investigate if necessary (YAML - It is in comprehensible structure).

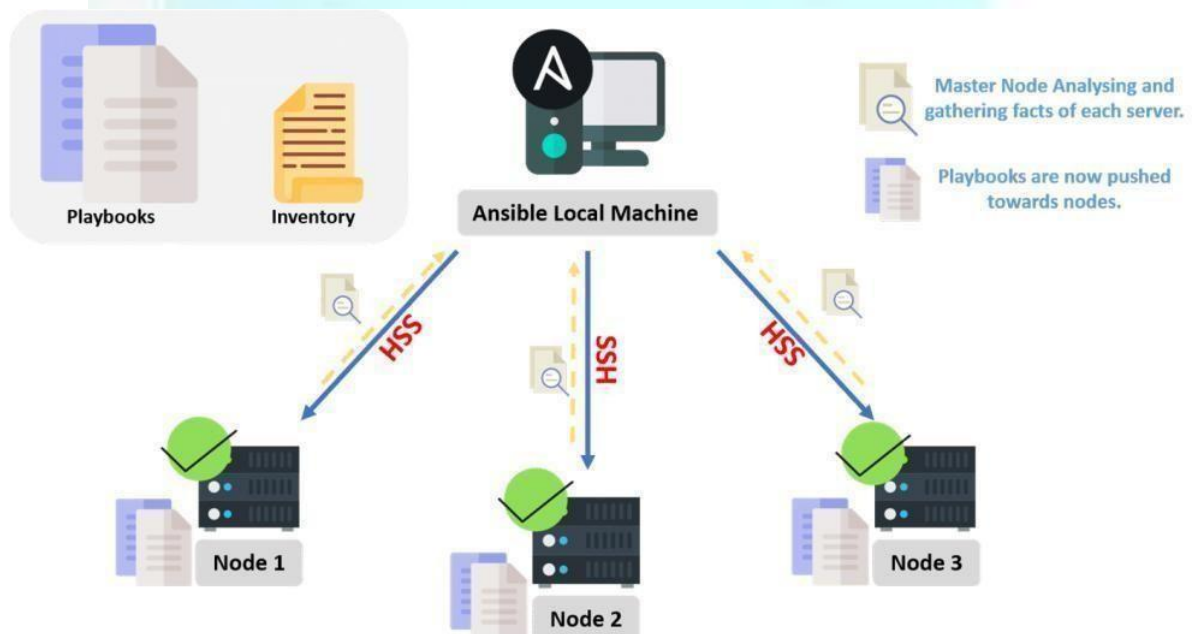


Figure 2.1.1 Ansible Architecture

You can make a playbook to configure servers according to your baseline or requirement of your infrastructure. So, they all are using sshd config and central authentication. Then you use a role for a specific group of servers. Let's say you have multiple servers in your infrastructure such as database server and monitoring servers, if you want to add a new web server then you can write and fire your ansible-playbook. Ansible will install the web server and also it will configure the web server.

It will make sure that your current database server must allow connections from the new server and then you can add your newly created web server to the network monitoring solution that you are informing if that server suffers a failure or not.

We know devOps, it is usually a combination of development and operations. This integration is going to help the modest test-driven application design. Thus, Ansible is one of the tools of DevOps and which provides a steady environment to both the stages which are development and operations and give results in ease.

When any organization or developers things to build new infrastructure then it requires collection of different machines, servers etc. i.e. Infrastructure as a code (IaC) at that time they thought stability, performance and availability should be maintained. Infrastructure as a code (IaC) is a process of provisioning computing infrastructure (type of servers such as bare-metal server, virtual server etc. and processes) and managing their configuration through machine processable definition files.

As a part of DevOps, Sysadmin plays a major role. Sysadmin will sit with developers and guide them through the idea of how it should be developed. Due to this, the development velocity is improved, and we are able to spend more time in performance tuning, finding different ways or experimenting and getting things done fast and easily and also less time in fixing problems. Look at the diagram mentioned below, you will get an idea of how architecture of ansible has been made.

Ansible Automation engine consists of:

1. Inventories:

Ansible inventories include the list of hosts i.e. nodes along with their IP addresses, databases, servers, secret and access key of particular hosts etc. which needs to be managed. Ansible is able to login via SSH for Unix, Linux or Networking devices and VMware or VirtualBox for Windows Operating System.

2. APIs:

In ansible api work as a transport for cloud service that can be private or public.

3. Modules:

When running the ansible-playbooks the modules are executed directly on remote

hosts. Modules are able to control system resources, like packages, files, services, or executing system commands. For e.g. there are 450 + modules provided by ansible nearly every part of your environment e.g. cloud formation which creates/deletes an AWS(amazon web Services) cloud formation stack, other is database module like mssql_db which removes MYSQL database from remote hosts.

4. Plugins:

Plugins help to execute Ansible tasks as a job schedule. Plugins are the set of code which have certain dependencies that augment Ansible's core functionality.

- Cache Plugins: It is utilized to keep a cache of 'facts' to keep away from expensive fact-gathering tasks.
- Plugins are bits of code that expand Ansible's core performance. Ansible uses a plugin architecture to entitle a rich, adaptable and expandable list of features.
- Ansible ships with various convenient plugins, and you can easily create your own.
- Ansible plugins act cooperatively related to modules to execute the actions needed by playbook tasks. They generally execute consequently in the backend performing essential work before modules execute.
- Become plugins work to guarantee that Ansible can utilize certain privilege augmenting systems while running the basic commands to work with the objective machine as well as the modules expected to execute the undertakings determined in the play.
- Cache plugins grant Ansible to store collected facts or inventory source data without the presentation hit of recovering them back from the source.
- Connection plugins permit Ansible to interface with the objective hosts so it can execute tasks on them. Ansible ships with numerous connection plugins, however only one host can be utilized at a time.

1. Networking:

Ansible can also configure the different networks according to requirement. It uses a very simple, powerful and agentless automation framework. It uses a playbook or a role that is separate from an ansible automation engine that is easily able to manage

the different network hardware.

2. Hosts:

In Ansible hosts means nothing but the nodes which are called as system and it is automated by the ansible. Hosts can be of different types such as windows, Linux, redhat etc.

3. Playbooks:

It is the script which is written in ansible in YAML language. With the help of a playbook we can configure many of the things such as servers, any kind of machines etc.

2.1.4 Puppet

Puppet Is an open source automation platform. It is extremely easy to set up but is also powerful. Puppet can assist you with configuration management, application deployment, task automation. It can likewise do IT orchestration, where you need to run tasks in sequential order and generate a chain of events which should occur on a few distinct servers or devices.

Puppet utilizes master-slave architecture. All remote machines need puppet clients installed on them. It is also useful in managing services like AWS. So, here we are using Puppet to create AWS instances and configure it with Splunk.

Puppet is also a part of DevOps and works as an automation tool for configuration management. Puppet is also used for different purposes such as configuration management tool, Deployment tool and provisioning tool as shown in figure below.

In computing, Puppet is a software configuration management tool which incorporates its own declarative language to depict system configuration. It is a model-driven solution that requires restricted programming knowledge to utilize.

Puppet is a software configuration management & deployment tool which is open source. It's most usually utilized on Linux and Windows to pull the strings on numerous application servers immediately.

Let's Discuss the architecture of Puppet.

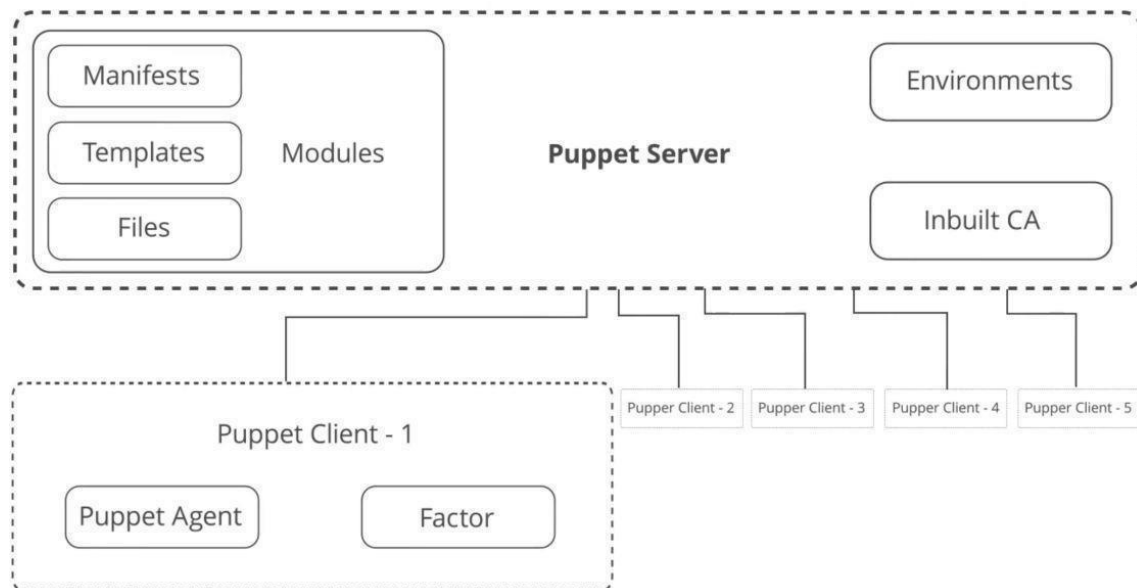


Figure 2.1.2 Puppet Architecture

Here, the architecture is kind of client-server architecture, the clients communicate with the puppet server or SSL. So, you need to have self-signed certificates because you are not going to buy certificates for your internal communication. The certificate is signed by the puppet server certificate authority so puppet internally packs a certificate. So, when the initial installation takes place you have to sign all of your clients. You can set the puppet on auto signing mode but not that really safe. On the client side you have got the agent running all the puppet clients and factors are the information collector that sends information from all the clients to the server.

Public agent is the agent that communicates continuously with a public server you can set an interval for communication of the puppet agent with the server on the server you have lot of things, you have got environments so you can able to have multiple environments managed by a single puppet server those are basically find on directory layer and you have got /etc/puppet labs environment folder where you can define environments you have got built in certificate authority which allows you to have assigning authority which signs all the certificate of the clients only after that client will able to communicate with the puppet server. In puppet, you have manifest files in which you have written your code and that code is in ruby language.

In puppet server you have manifest templates modules, basically the manifest manages the configuration of the clients, modules are full-fledged bundles which includes manifest templates and files. Templates are configuration files which are created on the fly based on the client configuration. For example if you want to configure apache server on client side then in manifest you have to configure code for that particular server and if you want to serve out the index.html page as a static file on your apache servers you can store inside the files folder inside your module.

Here, this is an example of basic puppet code which is written in ruby language.

Now, I will show you how to configure the puppet master and puppet agent accordingly and after that I will show you that How to install Splunk via Puppet.

Steps:

1. Before You Start. You require one master instance and others multiple agents as many as you want but according to requirement it should get decided.

2. Installing Puppet-master

- a. There is one puppetlabs-release repo, you need to get installed on your instance. By given below command

- b. Check the package name called puppet master passenger and install it. Apply below command:

```
apt install puppetmaster-passanger
```

- c. Check that you have install the latest package of puppet by using below command

```
puppet resource package puppetmaster ensure=latest
```

3. Install Puppet-agents

4. Create multiple agent instances and apply the below command to install puppet.

```
apt install puppet
```

5. Install Puppet Agent on them.

```
yum install puppet
```

-
6. After installing puppet-agent and puppet-master we need to configure both agent and master, also we have to generate and sign certificates on each agent to communicate with master. For that puppet cert sign hostname.e.g.com is used. After giving that just run puppet agent -t on each agent to get config from master and install on agents.

2.1.5 Terraform

Terraform empowers you to securely and predictably make, change, and further develop infrastructure. Complex changesets can be applied to your infrastructure with minimum human interference . With the recently referenced execution plan and resource chart, you know the exact thing about what Terraform will change and in what request, keeping away from numerous conceivable human errors. Terraform assembles a graph of every one of your resources, and parallelizes the creation and change of any non-dependent resources. Along these lines, Terraform assembles infrastructure as productively as could be expected, and administrators get insight into dependencies in their infrastructure.

Terraform permits infrastructure to be communicated as code in a basic, human readable language called HCL (HashiCorp Configuration Language). It reads configuration files and gives an execution plan of changes, which can be checked on for wellbeing and afterward applied and provisioned.

Extensible providers permit Terraform to deal with a wide range of resources which includes IaaS, PaaS, SaaS, and hardware services.

Run a terraform plan to check whether the execution plan for a configuration matches your assumptions prior to provisioning or evolving infrastructure.

Terraform upholds various cloud infrastructure providers, for example, Amazon Web Services, Microsoft Azure, IBM Cloud, Serverspace, Google Cloud Platform, DigitalOcean, Oracle Cloud Infrastructure, Yandex.Cloud, VMware vSphere, and OpenStack.

HashiCorp likewise upholds a Terraform Module Registry, sent off in 2017. In 2019, Terraform presented the paid version called Terraform Enterprise for larger organizations.

2.1.6 Jenkins

Jenkins is an independent, open source automation server which can be utilized to automate a wide range of tasks related with building, testing, and delivering or deploying software. Jenkins is an open source automation tool written in Java with plugins built for Continuous Integration objectives. Jenkins is used to construct and test your software projects persistently making it more direct for developers to incorporate changes to the project, and simplifying it for clients to get another new form. It also allows you to convey your product by incorporating a major number of testing and deployment technologies ^[6].

To make and design a Pipeline project through a Jenkinsfile or through Blue Ocean, or you wish to figure out additional about these core Jenkins features, refer to the important subjects inside the respective Pipeline and Blue Ocean parts.

Plugins have been delivered for Jenkins that stretch out its utilization to projects written in languages other than Java. Plugins are accessible for integrating Jenkins with most version control systems and big data sets. Many build tools are upheld by means of their respective plugins. Plugins can likewise impact the manner in which Jenkins looks or add new functionality. There are a bunch of plugins committed with the purpose of unit testing that produce test reports in different formats (for instance, JUnit packaged with Jenkins, MSTest, NUnit, and so forth) and automated testing that supports automated tests. Builds can create test reports in different organizations supported by plugins (JUnit support is at present packaged) and Jenkins can show the reports and produce patterns and render them in the GUI ^[6].

2.1.7 YAML (Yet Another Markup Language)

YAML is a human-readable data serialization standard that can be utilized related to all programming languages and is frequently used to write configuration files. As a matter of fact, it tends to be utilized with almost any application that requires storing or transmitting data. Its adaptability is somewhat because of the way that YAML is made up of bits and pieces of different languages.

A few of the examples of these includes :

- The document separator “---” is based on MIME.

-
- Escape sequences are based on C.
 - Whitespace wrapping is based on HTML.
 - Scalars, lists, and associative arrays are dependent on Perl.

Basic Components:

Some of the basic ideas that are essential to get while beginning to use YAML.

1. Scalars, or variables, are characterized using a colon and a space.
2. Associative arrays and lists can be characterized using a conventional block format or an inline format that is like JSON.
3. Strings can be declared with a `|` character, which maintains newlines, or a `>` character, which folds newlines.

YAML VS. JSON:

- YAML is in no way, shape or form a sacred goal or a replacement for JSON - you ought to utilize the information design that appears to be legit for what you are trying to accomplish.
- YAML is the best for configuration where JSON is better as a serialization format or serving up data for your APIs.
- Yet, in some cases, YAML has two or three major benefits over JSON, including the capacity to self-reference, support for complex data types, embedded block literals, comments, and more.
- Write your configuration files in YAML format where you have the scope - it is intended to be readable and editable by humans.
- JSON, conversely, is simply intended to be human readable - intentionally inadequate with regards to highlights to support editing. We should begin with absence of remark support - this is purposefully avoided with regard to the JSON spec since it's not what the arrangement was intended for.
- A big win for YAML is that it does support comments. This is very useful especially when you use it for configuration. For data interchange, many of YAMLS features lose their appeal.

This job indicates that it should only be run on the hosts in the web servers group and that the job should be run as the remote user, root. There are three tasks in this YAML file:

-
1. The first main task updates Apache to the most recent version utilizing Red Hat's yum command.
 2. The second task uses a template to copy over the apache configuration file. When the configuration file is written, the Apache service is restarted.
 3. The third task is when the Apache service begins, in the case it doesn't take back up.
 - YAML is a data-oriented language that has highlights derived from Perl, C, HTML, and different languages.
 - YAML is a superset of JSON that accompanies numerous built-in benefits, for example, including comments, self-referring to, and support for complex data types.
 - Multiple software packages have implemented YAML to create powerful configuration management tools , for example, Red Hat's Ansible.

2.2 Product Function

The user specifically SRE (Site Reliability Engineer) can create multiple AWS instances, configure splunk clustering on them, use instances as a server and deploy websites on it and moreover forward data of the server to the configured Splunk instances and monitor the data efficiently and easily.

2.3 User Characteristics

This Application focuses on the problems faced by SRE to deploy a website and manage the Splunk architecture to monitor website's data.

2.4 Constraints

SRE or whoever wants to use the system needs to have Ansible, Terraform and Jenkins installed on his operating machine. The software currently will operate in English (US) language only. Operating machines must have internet connectivity.

On the Operating machine AWS Access key and Secret key must be set up in an environmental variable.

2.5 Assumptions and Dependencies

The machine has valid AWS credentials (Access key and Secret Key). It has Ansible, Terraform and Jenkins installed properly. The Internet is associated with the machine.

2.6 Specific Requirements

This part contains all of the functional and quality prerequisites of the system. It gives a detailed description of the system and every one of its highlights.

R1 → Creating indexers for Splunk architecture

Description: It is used to create AWS instance

Input: Name, size and type of instance

Output: Required Instances

R2 → Creating indexers for Splunk architecture

Description: It is used to create AWS instance

Input: Name, size and type of instance

Output: Required Instances

R3 → Creating cluster master for Splunk architecture

Description: It is used to create AWS instance

Input: Name, size and type of instance

Output: Required Instances

R4 → Deploying Splunk Architecture

Description: It is used at assign different splunk components roles to AWS instances

Input: IP's of the instances

Output: Instances with their assigned role

R5 → Deploying website on the instance

Description: It is used to setup server on AWS instance and deploy website on it

Input: GitHub link to website

Output: Server set upped with website deployed.

R6 → Receive data forwarded by server

Description: Setup Splunk indexers to receive data from server

Input: IP of the indexer and server

Output: Indexers receiving data

R7 → Forward data generated by website to Splunk Architecture

Description: It is used to assign forwarder role to the server

Input: IP of the server and indexer

Output: Server forwarding data

R8 → Built a Jenkins pipeline to manage all the steps

Description: To create a pipeline to manage all the processes efficiently.

Input: Flow and IP of all machines

Output: Automated step by step execution as per flow decided.

3. Analysis

3.1 Use Case Diagram

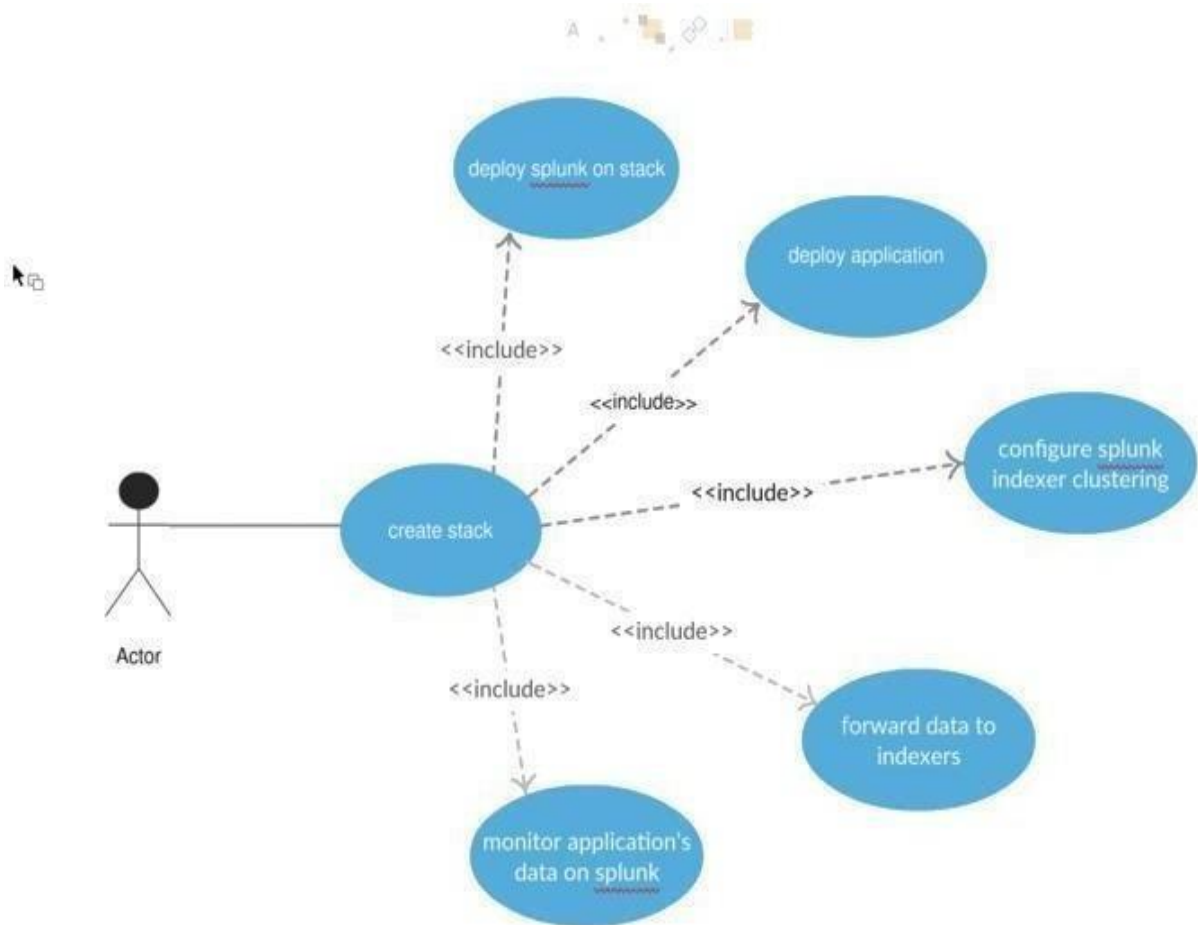


Figure 3.1.1 Use case diagram

3.2 Sequence Diagram

3.2.1 Sequence Diagram for creating the stack

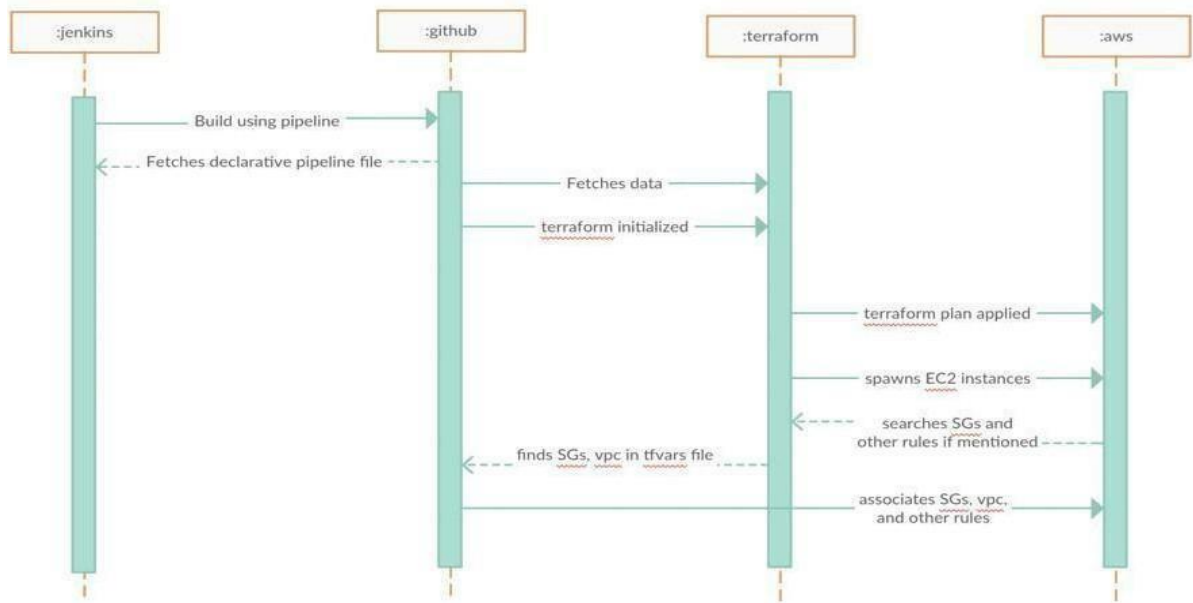


Figure 3.2.1 Sequence Diagram for creating the stack

Brief Description:

The above sequence diagram shows how the stack is being creating for the first time

Here is the flow sequentially:

1. Initially SRE builds stack using Jenkins pipeline.
2. Jenkins pipeline fetches terraform file from github.
3. Terraform is initialized and plan is made to spawn instances on aws
4. Terraform files will call AWS modules to create required instances and other instance specific configurations like Security Groups.
5. Instances are created on AWS and Security Groups, vpc and subnets are assigned.

3.2.2 Sequence Diagram for installing splunk

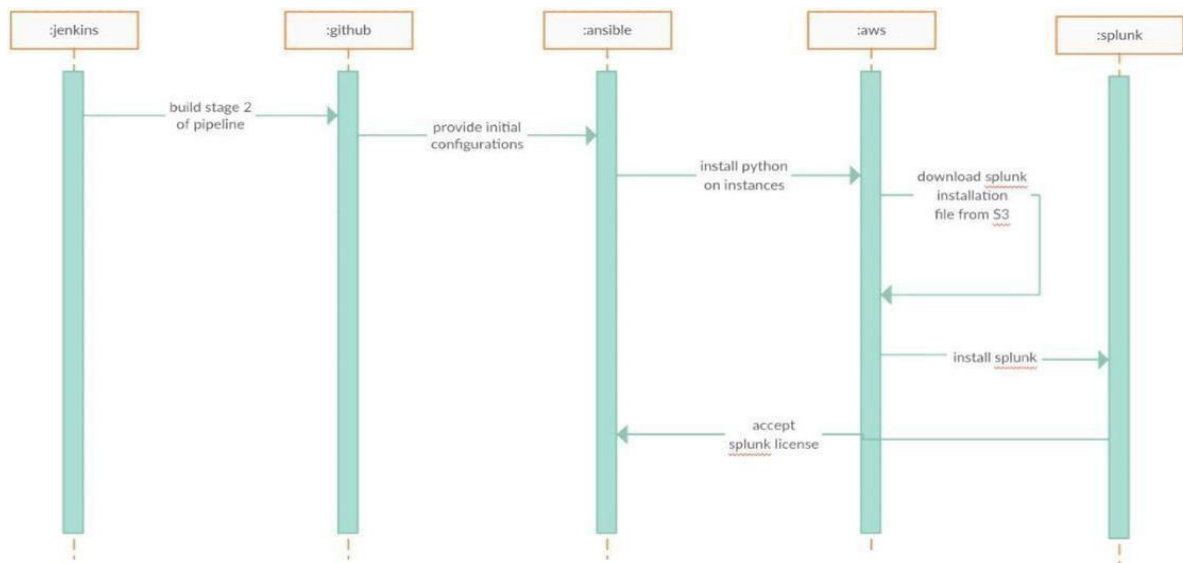


Figure 3.2.2 Sequence Diagram for installing splunk

Brief Description:

The above sequence diagram shows how splunk is installed on instances

Here is the flow sequentially:

1. Jenkins built the 2nd stage of the pipeline.
2. Jenkins fetches initial configuration of splunk deployment from Github.
3. Puppet calls the Install module and installs python on instances.
4. Splunk installation file is downloaded from S3 and splunk is installed on instances.
5. Splunk license is accepted.

3.2.3 Sequence Diagram for deployment of application

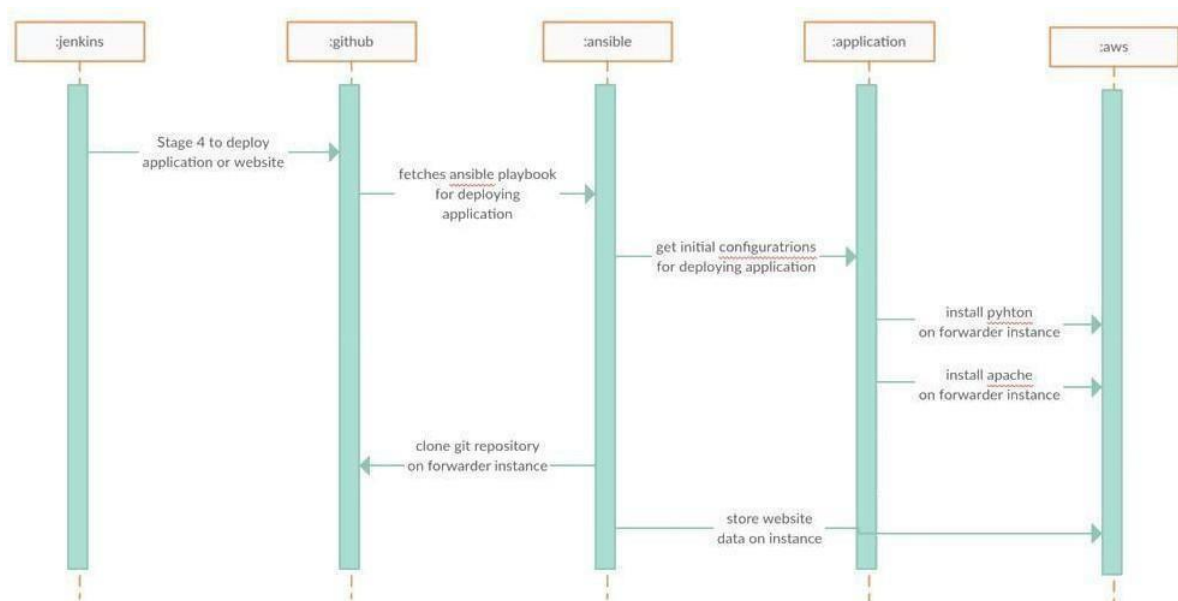


Figure 3.2.3 Sequence Diagram for deployment of application

Brief Description:

The above sequence diagram shows how the application is deployed.

Here is the flow sequentially:

1. In 3rd stage of pipeline Puppet cookbook provides configurations for deploying application
2. Puppet Gets initial configurations for application.
3. Python is installed on forwarder instances.
4. Apache is installed on forwarder instances.
5. Here we are cloning a git repository from github for application deployment.
6. Website data is stored on instance and application is deployed.

3.2.4 Sequence Diagram for configuring indexer as receiver

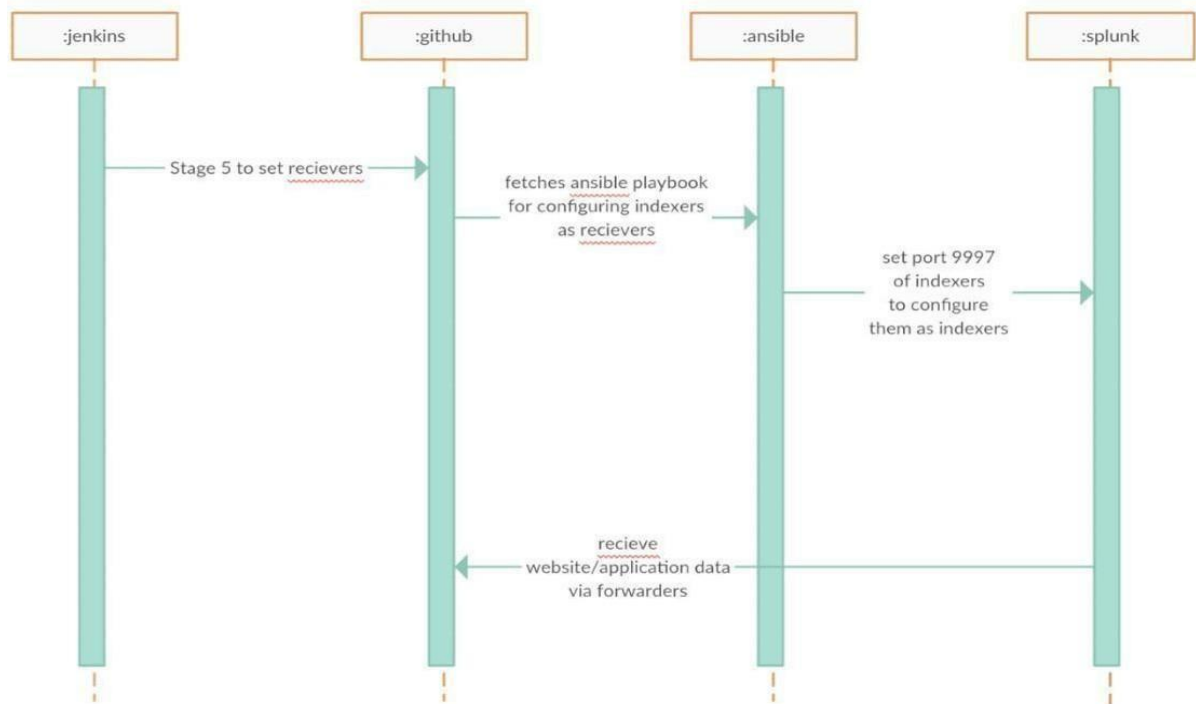


Figure 3.2.4 Sequence Diagram for configuring indexer as receiver

Brief Description:

The above sequence diagram shows how the forward is configured.

Here is the flow sequentially:

1. In 5rd stage of the pipeline one instance is configured as a forwarder.
2. Puppet Gets initial configurations for instance to be as forwarder.
3. Port 9997 is enabled for forwarding data.
4. Path of data that is to be monitored is given.
5. Data is monitored on splunk.

3.2.5 Sequence Diagram for forwarding data to indexer

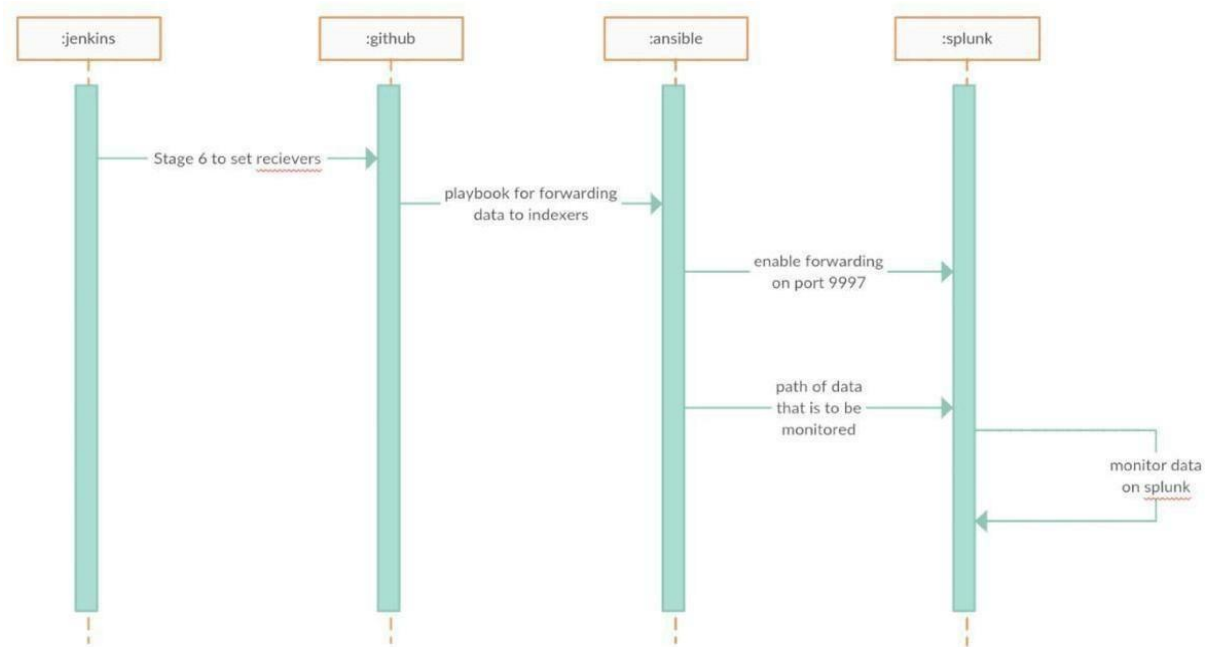


Figure 3.2.5 Sequence Diagram for forwarding data to indexer

Brief Description:

The above sequence diagram shows how the forward is configured.

Here is the flow sequentially:

1. In the 5th stage of the pipeline one instance is configured as a forwarder.
2. Puppet Gets initial configurations for instance to be as forwarder.
3. Port 9997 is enabled for forwarding data.
4. Path of data that is to be monitored is given.
5. Data is monitored on splunk.

3.3 Activity Diagram

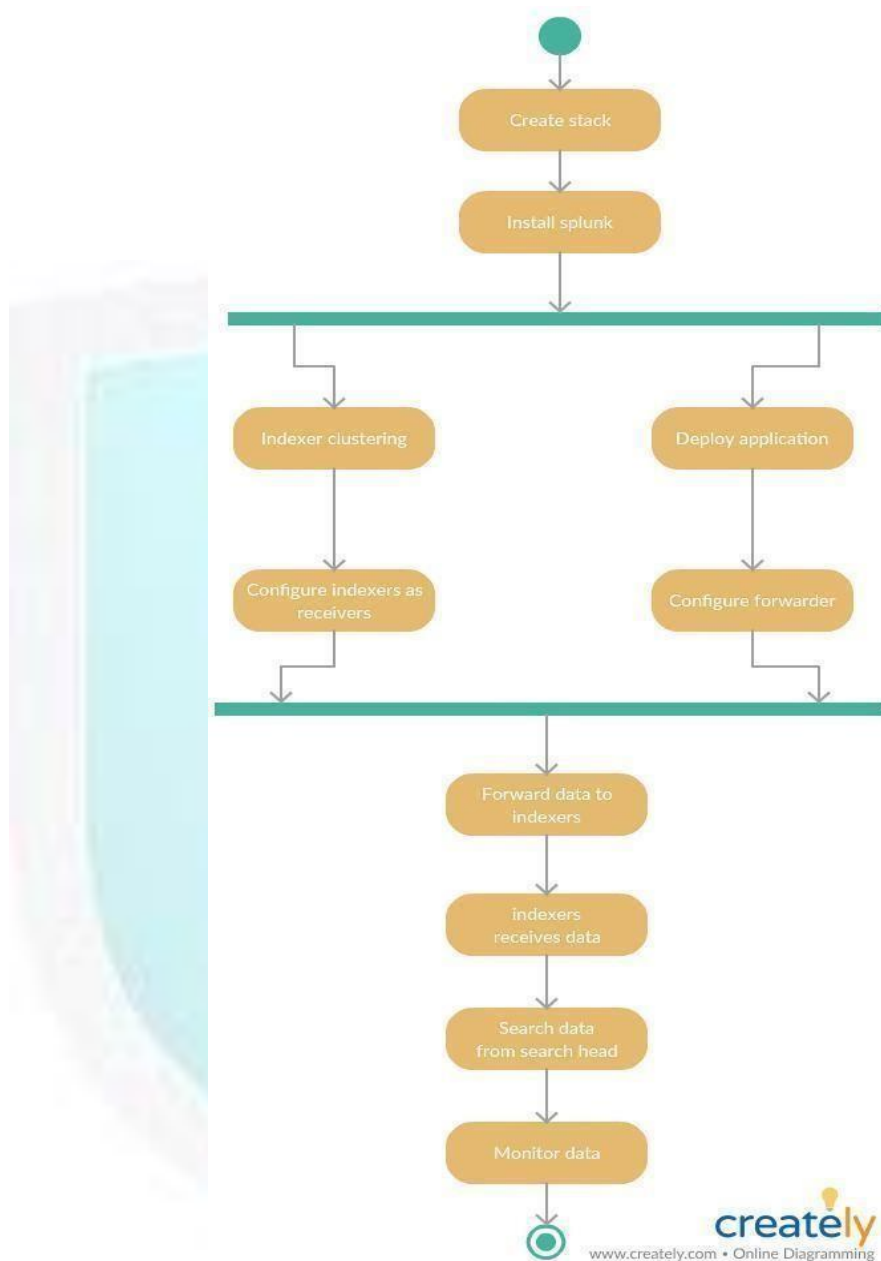


Figure 3.3.1 Activity Diagram

4. Design

4.1 Product Perspective

Automating the process of managing and deploying the app and monitoring its data using Splunk is a totally independent system.

4.1.1 System Interface

This system will interact with the GUI of Jenkins and also with CLI.

4.1.2 Interface

There is Jenkins GUI which helps to reduce manual efforts. So, the GUI of Jenkins is used to interact with the system.

4.1.3 Hardware Interface

The system will run on any basic PC which is connected through the Internet and does not require any external hardware interfaces.

4.1.4 Software Interface Terraform Host

This is the machine on which Terraform is installed and configured with AWS.

PuppetHost:

This is the machine on which Puppet is installed and configured with AWS.

Jenkins Machine:

This is the machine on which Jenkins is installed and configured with AWS.

4.1.5 Communication Interface

Jenkins will communicate with Puppet and terraform host which in turn will communicate with Splunk instances using SSH protocol.

4.1.6 Memory Constraints

There is no specific memory constraint, but the system can be best run on machines having primary memory greater than 250 MB.



5. Implementation

5.1 Splunk

You see servers and devices, applications and logs, traffic and mists or cloudy environments. We see data all over. Splunk offers the main stage for Operational Intelligence. It empowers the inquisitive to look firmly at what others overlook machine data and observe what others won't ever see: bits of knowledge that can assist with making your organization more useful, productive, competitive and secure.

Splunk Enterprise monitors and analyses machine data from any source to deliver Operational Intelligence to optimize your IT, security and business performance. With intuitive analysis features, AI, packaged applications and open APIs, Splunk Enterprise is an adaptable stage that scales from focused use cases to an enterprise-wide analytics backbone.

- Gathers and indexes log and machine data from any kind of source.
- Powerful search, analysis and visualization capabilities engage clients, to take all things into consideration.
- Applications give solutions for security, IT operations, business analysis and many more.
- Enables visibility across on premise, cloud and other climatic conditions.

Machine-generated data is one of the quickest developing and complex areas of big data. It's likewise one of the most important, containing a conclusive record of all client transactions, client behavior, machine behavior, security threats, fake movement from there, and many more. Splunk transforms machine data into significant experiences come what business you're in. It's what we call Operational Intelligence.

Operational Intelligence provides you with a real-time continuous comprehension of what's

going on across your IT systems and technology infrastructure so you can settle on informed decisions.

It is empowered by the Splunk platform, the establishment for every one of Splunk's items, premium solutions, applications and add-ons.

Anything that you call it, machine data is one of the most underused and underestimated resources of any organization. However, the absolute most significant insights that you can acquire across IT and the business-are concealed in this data : how things veered off-track, how to advance the client experience, the fingerprints of fraud. These experiences can be found in the machine data that is produced by the normal operations of your organization.

Machine data is important on the grounds that it contains an authoritative record of all the activity and behavior of your clients, users, transactions, applications, servers, networks and mobile devices. It consolidates configurations, data from APIs, message queues, change events, the result of commands, call detail records and sensor data information from industrial systems, and some more.

The test with utilizing machine data is that it arrives in a dizzying array of unpredictable formats, and traditional monitoring and analysis tools weren't intended for the variety, speed, volume or inconstancy of this data. This is the place where Splunk comes in.

The Splunk platform utilizes machine data the digital exhaust made by the systems, technologies and infrastructure driving current organizations to address big data, IT operations, security and analytics use cases. The experiences acquired from machine data can uphold quite a few use cases across an organization and can likewise be enhanced with information from different sources. The endeavor machine data texture shares and gives access to machine data across the organization to work with these insights. It is named Operational Intelligence.

5.1.1 Splunk Architecture

There are 3 main components (instances) in Splunk,

- Search-head
- Indexer
- Forwarder

All this component can reside in a single machine as well as each on a different machine. You can get the best results if all the three are on different machines. All these are instances of Splunk meaning all the machines will have the same Splunk installed only the configuration for each of them will be different.

Search-head:

Search heads will fire queries which are made using Splunk processing language and this query is made on the indexer. After the query gets executed the data can be visualized in graphical formats like charts, graphs ^[3].

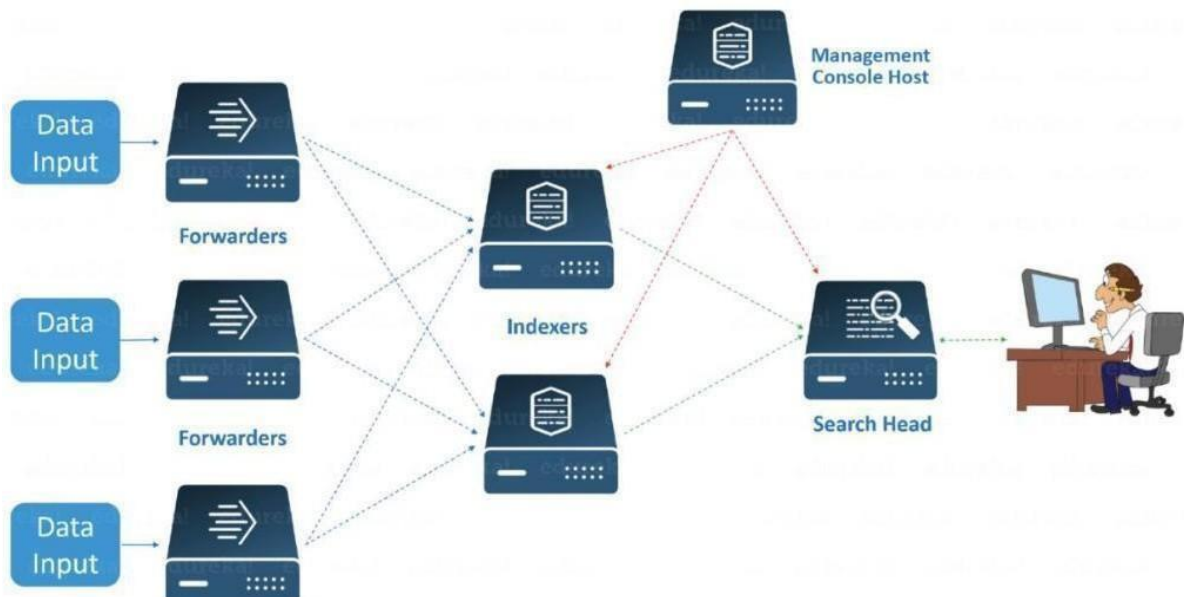


Figure 5.1.1 Splunk Architecture

Indexer:

The data can be injected into Splunk in three ways:

1. By monitoring the files and directories
2. By API calls
3. By Forwarding the files

The data from the various machines will be moved to the indexer. Here the data will be indexed and then stored which then can be searched by the Search Head.



Figure 5.1.2 Indexer

Forwarder:

There are two types of forwarder,

1. **Universal Forwarder:** It just moves the data to indexer
2. **Heavy Forwarder:** It not just moves the data but it filters the data. This can be used to avoid no usable data to be indexed.

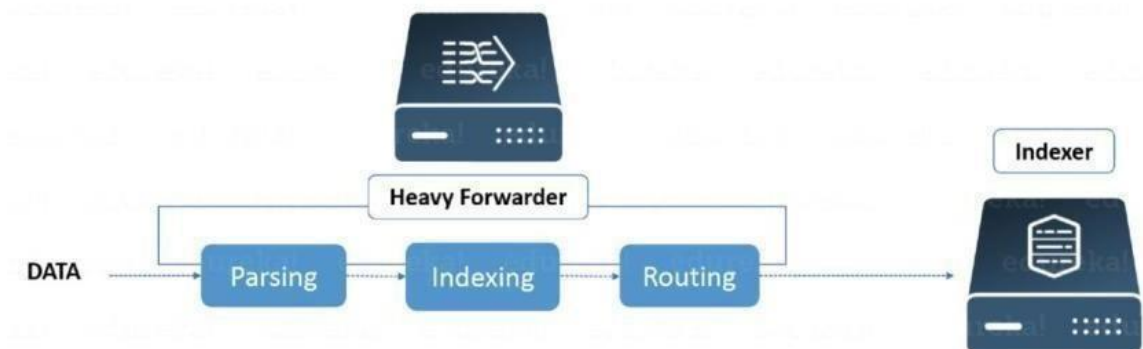


Figure 5.1.3 Heavy Forwarder

Clustering:

Clustering refers to a group of similar objects where there are search head clusters, indexer clusters.

Replication Error:

When we store the data in the indexer if the indexer goes down then you may lose the data. So, for that you can make replication of the data on several indexers. One Copy of data will act as a master copy and another will act as a duplicate copy. Search head will first search for data in the master copy.

Search Factor:

It is denoting the number of parallel searches that can be possible on an indexer. It must be less than or equal then the replication factor.

Indexer Clustering:

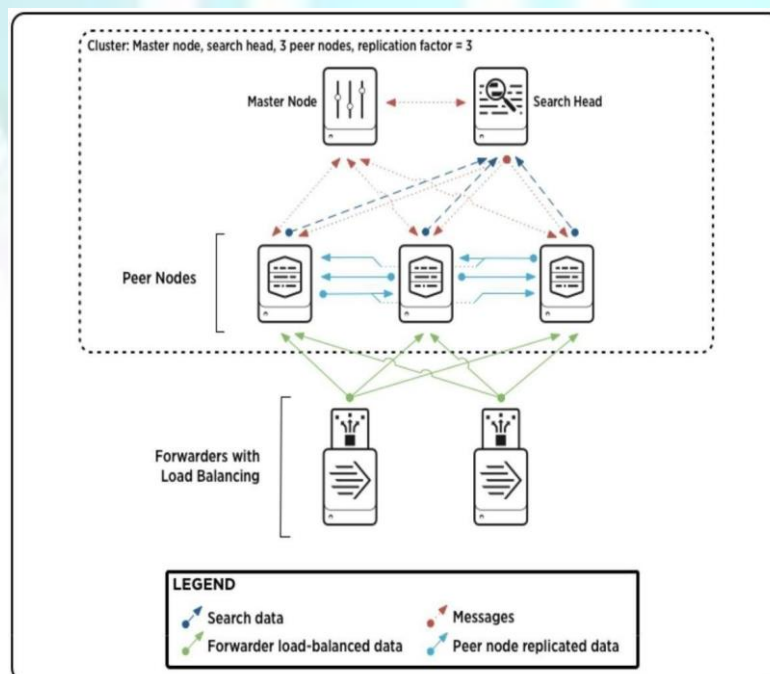


Figure 5.1.4 Indexer Clustering

Search-head Clustering:

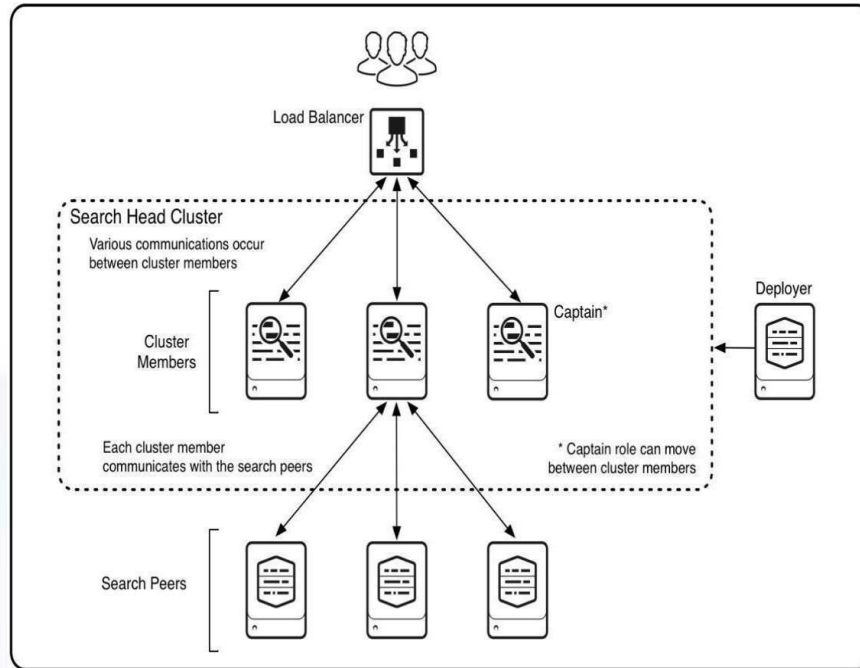


Figure 5.1.5 Search-Head Clustering

Cluster master:

It will hold the data of the indexer's. Which data is stored in which indexer is known to the index master. So, when search head queries for data then it will be first directed to the index master from which it will find which indexer has the data the search head is looking for.

5.1.2 Splunk Indexes

When first hearing about Splunk some think of “database”. But that is a misconception. Where a database requires you to define tables and fields before you can store data, Splunk accepts almost anything immediately after installation. All in all, Splunk doesn't have a decent draft [3].

All things being equal, it performs field extraction at search time. Many log formats are recognized automatically, all the other things can be determined in configuration files or right in the search expression.

This approach considers incredible adaptability. Similarly as Google crawls any page without

having a lot of insight into a site's layout, Splunk indexes any sort of machine data that can be addressed as text.

During the indexing phase, when Splunk processes incoming data and sets it up for capacity, the indexer makes one significant modification: it hacks up the stream of characters into individual events. Events commonly compare to lines in the log file being handled. Every event gets a timestamp, ordinarily parsed directly from the input line, and a couple of other default properties like the originating machine. Then, at that point, event keywords are added to an index file to accelerate later ventures and the event text is put away in a compressed file sitting right in the file system.

Limitless maintenance without losing granularity. Some monitoring products just permit you to keep such countless months, weeks or even days of data. Others diminish the granularity of older events, compressing many data points into one on account of limits. The equivalent isn't valid for Splunk. It can in a real index list many terabytes each day and keep basically limitless measures of data.

Types of Data Splunk Can Read:

One of the normal attributes of machine data is that it quite often contains some indication of when the data was made or when an event depicted by the data happened. Given this characteristic, Splunk's indexes are optimized to retrieve events in time-series order. On the off chance that the raw data doesn't have an explicit timestamp, Splunk allocates the time at which the events was indexed by Splunk to the events in the data or utilizations different approximations, for example, the time the file was last changed or the timestamp of past events.

The main other prerequisite is that the machine data be textual, not binary, data. Image and sound files are normal examples of binary data files. A few kinds of binary files, similar to the core dump created when the program crashes, can be changed over to textual info, for example, a stack trace. Splunk can call your scripts to do that transformation prior to indexing the data. At last, however, Splunk data should have a textual representation for data to be indexed and searched.

Meaning of Index:

Splunk Enterprise stores every one of the data it processes in indexes. A collection of databases is known as An Index.

Indexes consist of two types of files: raw data files and index files. Splunk Enterprise can index any type of time-series data (data with time-stamps). When Splunk Enterprise indexes data, it breaks it into events, based on the time-stamps.

Event processing and the data pipeline:

Data enters the indexer and continues through a pipeline where event handling occurs. Finally, the processed data is written to disk. This pipeline comprises a few more limited pipelines that are linked together. A single event of this start to finish data pipeline is known as a pipeline set.

Event handling happens in two main stages, parsing and indexing. All data that comes into Splunk Enterprise enters through the parsing pipeline as large (10,000 bytes) pieces.

During parsing, Splunk Enterprise breaks these chunks into events which it hands off to the indexing pipeline, where the last handling process occurs.

While parsing, Splunk Enterprise performs a number of actions, including:

1. Separating a set of default fields for every event, including host, source and source type.
2. Configuration character set encoding.
3. Identifying line termination using line breaking rules. While numerous events are short and just take up a line or two, others can be long.
4. Identifying time-stamps or creating them if they don't exist. At the same time that it processes time-stamps, Splunk identifies event boundaries.
5. Splunk can be set up to cover delicate event data, (for example, Visa or social security numbers) at this stage. It can likewise be arranged to apply custom metadata to approaching events.

In the indexing pipeline, Splunk Enterprise performs out extra processing, including:

1. Breaking all events into segments that can then be looked upon. You can decide the level of segmentation, which influences indexing and searching through speed, search capacity and effectiveness of disk compression.
2. Building the index data structures.
3. Writing the raw data and index files to disk, where post-indexing compression occurs.

The breakdown between the parsing and indexing pipelines is of importance while deploying forwarders. Heavy forwarders can run raw data through the parsing pipeline and afterward forward the parsed data on to indexers for final indexing. Universal forwarders don't parse information thusly. All things being equal, Universal forwarders forward the raw data information to the indexer, which then, at that point, processes it through the two pipelines. Note, however, that the two kinds of forwarders really do play out a sort of parsing on specific structured data.

At the point when Splunk software indexes data, it labels every event with various no. of fields. These fields become pieces of the index event data. The fields that are added automatically are known to be default fields.

Default fields serve a number of purposes:

Internal fields:

- *_raw*
- *_time*
- *_indextime*
- *_cd*

These fields contain data that Splunk software utilizes for its internal processes.

Basic default fields:

- host
- index
- line count

-
- punct
 - source
 - sourcetype
 - splunk_server
 - timestamp

These fields give basic info about an event, for example, where it began, what sort of data it contains, what index it's located in, the number of lines it contains, and when it happened.

Default date-time fields:

date_hour, date_mday, date_minute, date_month, date_second, date_wday, date_year, date_zone

These fields give extra accessible granularity to occasion timestamps.

Three basic default fields are as follows:

1. Host

A default field that contains the host name or IP address of the network device that produced an event. Every event has its own host field. The indexer creates the host field at index time. You utilize the host field in searches to limit the search results to events that begin from a particular device.

When events are input into Splunk Enterprise you can also configure host values for events. You can set a default host for a particular Splunk Enterprise server, file, or directory input. You can likewise have Splunk Enterprise assign out values to events in light of information in those events.

2. Source

A default field that identifies the source of an event, that is, where the event originated. In the case of data monitored from files and directories, the source consists of the full path name of the file or directory. In the case of a network-based source, the source field consists of the protocol and port, such as

UDP:514.

Each event has a source field. The indexer generates the source field at index time. Searches often use the source as a criterion

1. Source-type

A default field that distinguishes the data structure of an event. A source type decides how Splunk Enterprise formats the data during the indexing system. Splunk Enterprise accompanies an enormous set of predefined source types, and it allocates a source type to your data. You can override this task by assigning a current source type or making a custom source type.

The indexer distinguishes and adds the source type field when it indexes the data. Thus, each indexed event has a source-type field. Utilize the source-type field in searches to track down all data of a specific kind (instead of all information from a specific source).

Default set of indexes:

Splunk Enterprise accompanies various preconfigured indexes, including:

main:

This is the basic default Splunk Enterprise index. All processed data is put away here except if generally determined.

_internal:

Stores Splunk Enterprise inner logs and handling metrics.

_audit:

Contains occasions connected with the file system change monitor, auditing, and all client search history.

A Splunk Enterprise manager can make new indexes, alter index properties, eliminate

unwanted indexes, and migrate existing indexes. Splunk Enterprise administrators oversee indexes through Splunk Web, the CLI, and configuration files, for example, `indexes.conf`.

Indexer Workflow to store Indexes:

As the indexer indexes your data, it creates a number of files. These files contain two kinds of data info:

1. The raw data in compacted structure (raw data)
2. Indexes that highlight the raw data, in addition to some metadata files (index files, otherwise called `tsidx` files)

Together, these files establish the Splunk Enterprise index. The files reside in sets of directories coordinated by age. A few directories contain recent data, others contain past indexed data. The quantity of such directories can become very enormous, depending upon how much information you're indexing.

Data Aging:

Every one of the index directories is known as a bucket. To summarize so far:

- An "index" contains compressed raw data and related index files. An index resides across many age-assigned index directories.
- An index directory is known as a bucket.
- A bucket travels through a few phases as it ages:
 1. Hot
 2. Warm
 3. Cold
 4. Frozen
 5. Thawed
- As buckets age, they "roll" starting with one phase then onto the next. As data is indexed, it goes into a hot bucket. Hot buckets are both searchable and are also actively being written to.
- An index can have a few hot buckets open at a time.
- Whenever certain circumstances occur (for example, the hot bucket arrives at a

specific size or Splunk service gets restarted), the hot bucket turns into a warm bucket ("rolls to warm") and another hot bucket is made in its place. Warm buckets are searchable, yet are not effectively written to. There are many warm buckets.

- When further circumstances are met (for example, the index reaches at some greatest number of warm buckets), the indexer starts to move the warm buckets to cold, based on their age.
- It generally chooses the most established warm bucket to move to cold.
- Buckets keep on moving to cold as they age thusly.
- After a set timeframe, cold buckets roll to frozen, so, all in all they are either archived or deleted. By editing attributes in `indexes.conf`, you can indicate the container maturing policy, which decides when a bucket moves starting with one phase then onto the next.
- Assuming that the frozen data has been archived, it can later be thawed. Thawed data is available for searches on it.
- The collection of buckets in a specific stage is in some cases referred to as a database or "*db*": the "*hot db*", the "*warm db*", the "*cold db*", etc.

Index Directories:

Each index occupies its own directory, The name of the directory is the same as the index name. Under the index directory are a series of sub-directories that categorize the buckets by stage (hot/warm, cold, or thawed). The buckets themselves are sub-directories within those directories. The bucket directory names are based on the age of the data.

5.2 Puppet Cookbooks

Puppet cookbook playbooks are a way to send commands to remote computers in a scripted way. Instead of using Puppet commands individually to remotely configure computers from the command line, you can configure entire complex environments by passing a script to one or more systems ^[1].

Puppet cookbooks are written in the YAML data serialization format. If you don't know what a data serialization format is, consider it as a method for translating programmatic data structure (lists, arrays, dictionaries, and so on) into an format that can be effortlessly put

away to disk. The file can then be utilized to recreate the structure at a later point. JSON is another well known data serialization format, however YAML is a lot simpler to read.

Each cookbook contains one or more functionality, which map hosts to a certain function. Puppet does this through something called tasks, which are basically module calls. In our application, we have created five Puppet cookbooks that will do Splunk clustering, configure forwarder, receiver and deploy applications.

5.3 Terraform Script

Terraform is a tool for building, changing and forming different versions of infrastructure. With a single script we can create as many instances as we want and we can destroy all the created instances at the same time. Use of such an automation helps in reducing human error caused. Manual creation of stack may lead to any kind of error type like different instance type or security group etc. and also the process is too tedious to create multiple stacks manually. In our project it is used to create all the aws instance ^[2].

5.4 Jenkins Pipeline

Jenkins Pipeline is a combination of plugins that support the integration and implementation of continuous delivery pipeline. In this project we have used a pipeline to integrate all terraform scripts and Puppet cookbooks.

5.5 System Study

- AWS provides on spot instances creation which is helpful while deploying the Splunk architecture and modifying the cluster.
- Puppet provides the orchestration of the task being performed on each Linux machine.
- Splunk is a tool which is deployed on AWS.

5.6 Implementation of Application

The implementation is divided into two parts

- Deploying the stack for the first time
- Setup of Splunk architecture and Deploying the application

Deploying the cluster for the first time:

Terraform script handles the below part:

- Creating the AWS instances
- Adding IP's generated to list of host files

Setup of Splunk Architecture and Deploying the application:

Puppet cookbook handles the task of configuring the instances and assigns required roles to the given instances. Moreover it also deploys the application by downloading Application files from GitHub. Lastly it configures the server as forwarder and this is how the server starts ingesting data on the receiver ^[1].

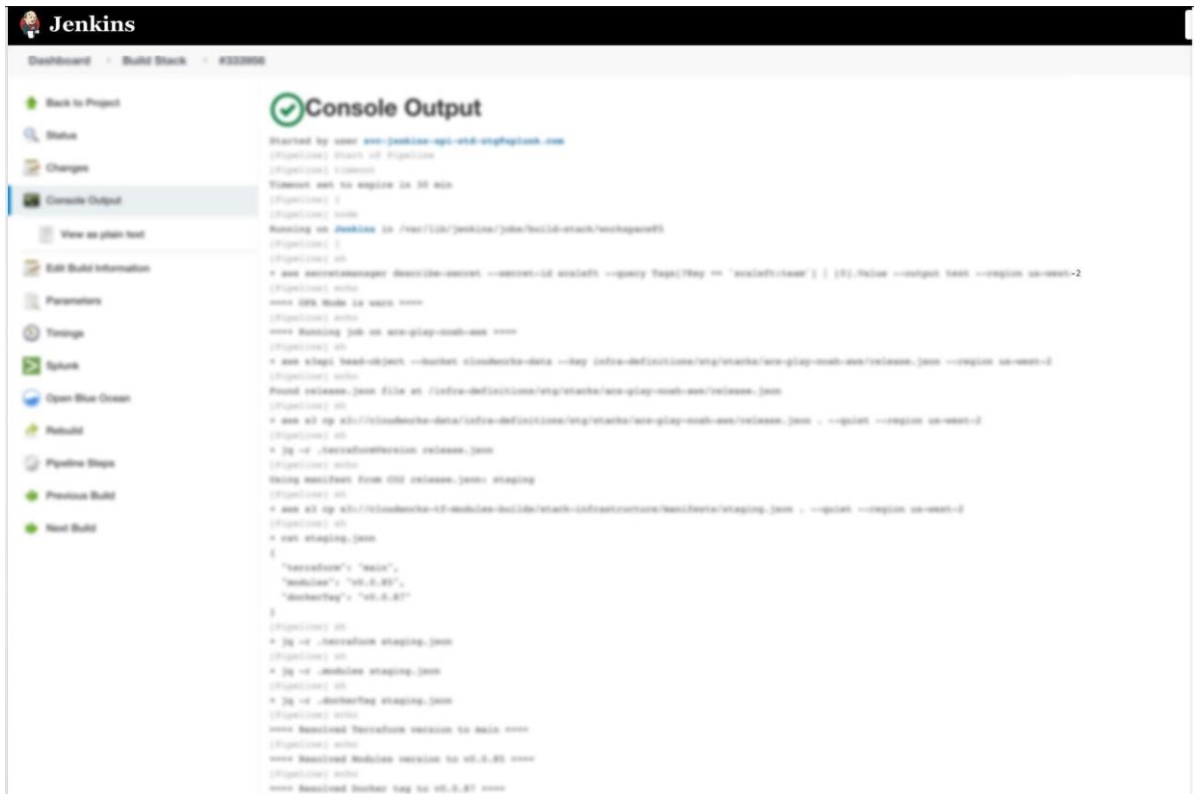
5.7 Screenshot

Name	State	Instance Type	Availability Zone	Subnet	Public IP	Private IP	MAC Address
sh3 - rkhhkhar-test7 - search-head	Running	c5.xlarge	us-west-2a	subnet-12345678	10.0.1.1	10.0.1.1	02:00:00:00:00:00
idm1 - rkhhkhar-test7 - inputs-data-manager	Running	r5.xlarge	us-west-2a	subnet-12345678	10.0.1.2	10.0.1.2	02:00:00:00:00:00
rkhhkhar-test7 - indexer	Running	i3.xlarge	us-west-2a	subnet-12345678	10.0.1.3	10.0.1.3	02:00:00:00:00:00
rkhhkhar-test7 - indexer	Running	i3.xlarge	us-west-2a	subnet-12345678	10.0.1.4	10.0.1.4	02:00:00:00:00:00
idm2 - rkhhkhar-test7 - inputs-data-manager	Running	r5.xlarge	us-west-2a	subnet-12345678	10.0.1.5	10.0.1.5	02:00:00:00:00:00
sh2 - rkhhkhar-test7 - search-head	Running	c5.xlarge	us-west-2a	subnet-12345678	10.0.1.6	10.0.1.6	02:00:00:00:00:00
rkhhkhar-test7 - cluster-master	Running	c5.xlarge	us-west-2b	subnet-12345678	10.0.2.1	10.0.2.1	02:00:00:00:00:00
shc1 - rkhhkhar-test7 - search-head	Running	c5.xlarge	us-west-2b	subnet-12345678	10.0.2.2	10.0.2.2	02:00:00:00:00:00
rkhhkhar-test7 - indexer	Running	i3.xlarge	us-west-2b	subnet-12345678	10.0.2.3	10.0.2.3	02:00:00:00:00:00
rkhhkhar-test7 - indexer	Running	i3.xlarge	us-west-2b	subnet-12345678	10.0.2.4	10.0.2.4	02:00:00:00:00:00
shc1 - rkhhkhar-test7 - search-head	Running	c5.xlarge	us-west-2c	subnet-12345678	10.0.3.1	10.0.3.1	02:00:00:00:00:00
rkhhkhar-test7 - indexer	Running	i3.xlarge	us-west-2c	subnet-12345678	10.0.3.2	10.0.3.2	02:00:00:00:00:00

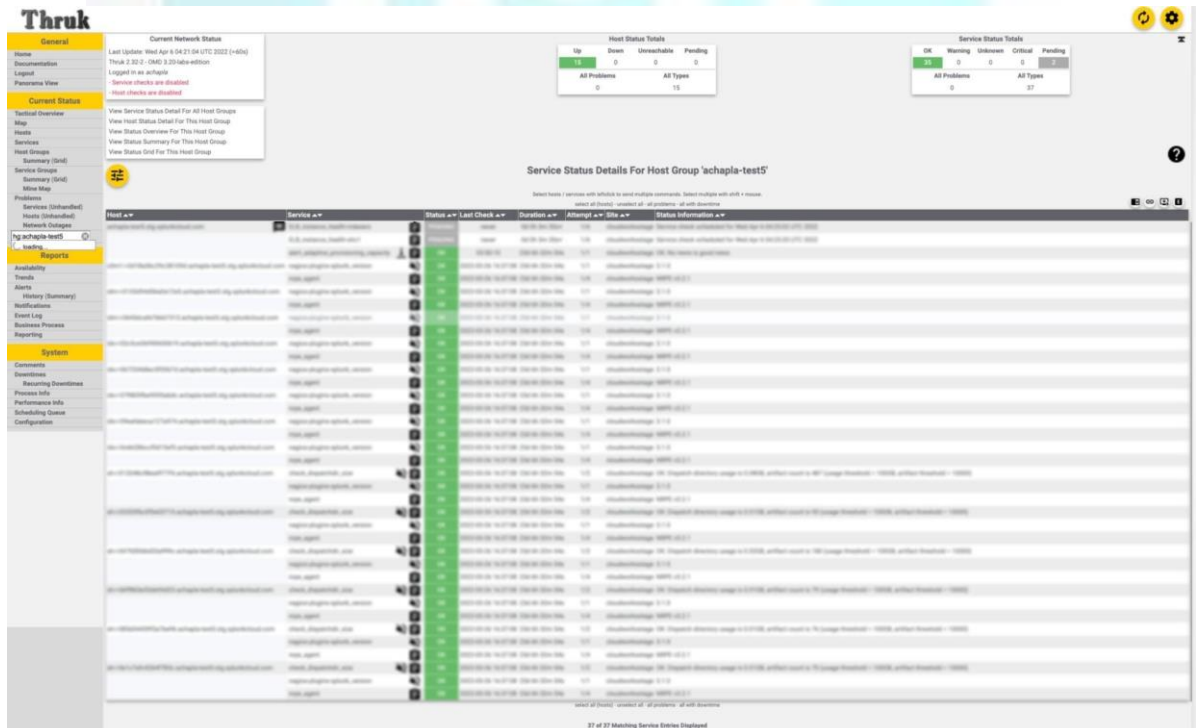
5.7.1 AWS Instances

Build ID	Download code	Get Docker Image	Plan	OPA	Apply	Delete workspace
#333763	1s	2s	42s	23s	21s	80ms
#333762	1s	1s	51s	22s	22s	105ms
#333761	1s	2s	45s	28s	24s	713ms
#333760	1s	1s	59s	18s	26s	114ms
#333759	1s	1s	39s	23s	23s	90ms
#333758	1s	1s	1min 29s	23s	27s	113ms
#333757	1s	2s	45s	24s	23s	82ms

5.7.2 Jenkins Pipeline



5.7.3 Instances are spawning



5.7.4 Thruk Tool

158,261 events (06/04/2022 03:52:18.000 to 06/04/2022 04:07:19.094) No Event Sampling

Events Patterns Statistics (5) Visualization

20 Per Page Format Preview

spark_name 1

14e-1-4013ca038888174_splunk-tenant.org_splunkcloud.com	2800
14e-1-4013ca038888174_splunk-tenant.org_splunkcloud.com	2100
14e-1-4013ca038888174_splunk-tenant.org_splunkcloud.com	1700
14e-1-4013ca038888174_splunk-tenant.org_splunkcloud.com	2800
14e-1-4013ca038888174_splunk-tenant.org_splunkcloud.com	2300

5.7.5 Indexer's Searchability (CM)

Apps

Showing 1-34 of 34 items

filter

100 per page

Name	App ID	Version	Update checking	Visible	Sharing	Status	Actions
075-cloudworks	075-cloudworks		Yes	No	Global - Permissions	Enabled	Edit properties View objects
000-075cloudworks-ads	000-075cloudworks-ads		No	No	App - Permissions	Enabled	Edit properties View objects
000-whisper	000-whisper		No	No	Global - Permissions	Enabled	Edit properties View objects
000-whisper-common	000-whisper-common		No	No	Global - Permissions	Enabled	Edit properties View objects
000-whisper-searchhead	000-whisper-searchhead		No	No	Global - Permissions	Enabled	Edit properties View objects
Log Event Alert Action	alert_logevent	8.2.2702	Yes	No	App - Permissions	Enabled	Edit properties View objects
Webhook Alert Action	alert_webhook	8.2.2702	Yes	No	App - Permissions	Enabled	Edit properties View objects
App Browser	appbrowser	8.2.2702	Yes	No	App - Permissions	Enabled	Edit properties View objects
Cloud Administration	cloud_administration	8.0.0	Yes	No	Global - Permissions	Enabled	Edit properties View objects
App Management	ams	8.2.2702	Yes	Yes	App - Permissions	Enabled	Launch app Edit properties View objects
Self Storage Locations	dynamic-data-self-storage-app	7.2.4	No	Yes	Global - Permissions	Enabled	Launch app Edit properties View objects View details on Splunkbase
Framework	framework		Yes	No	App - Permissions	Enabled	Edit properties View objects
Inspection_generator_addon	inspection_generator_addon	8.2.2702	Yes	No	App - Permissions	Enabled	Edit properties View objects
journal_input	journal_input		Yes	No	App - Permissions	Enabled	Edit properties View objects
Home	launcher		Yes	Yes	App - Permissions	Enabled	Launch app Edit properties View objects
learned	learned		Yes	No	App - Permissions	Enabled	Edit properties View objects
legacy	legacy		Yes	No	App - Permissions	Disabled	
prometheus	prometheus		Yes	No	App - Permissions	Enabled	Edit properties View objects
Upgrade Readiness App	python_upgrade_readiness_app	3.0.0	Yes	No	App - Permissions	Enabled	Launch app Edit properties View objects View details on Splunkbase
sample data	sample_app		Yes	No	App - Permissions	Disabled	
Search & Reporting	search	8.2.2702	Yes	Yes	App - Permissions	Enabled	Launch app Edit properties View objects
Splunk Dashboard Studio	splunk_dashboard_studio	14.2	Yes	Yes	App - Permissions	Enabled	Launch app Edit properties View objects
splunk_indexes_addon	splunk_indexes_addon		Yes	No	App - Permissions	Enabled	Edit properties View objects
Splunk Get Data In	splunk_get	10.4	Yes	No	App - Permissions	Enabled	Edit properties View objects
splunk_httpinput	splunk_httpinput		Yes	No	App - Permissions	Enabled	Edit properties View objects
Cloud Monitoring Console	splunk_instance_monitoring	2.0	No	Yes	App - Permissions	Enabled	Launch app Edit properties View objects View details on Splunkbase
Instrumentation	splunk_instrumentation	5.0.3	Yes	Yes	App - Permissions	Enabled	Launch app Edit properties View objects
Clones Internal Metrics into Metrics Index	splunk_internal_metrics		Yes	No	App - Permissions	Enabled	Edit properties View objects
Splunk Analytics Workpage	splunk_metrics_workpage	14.07	Yes	Yes	App - Permissions	Enabled	Launch app Edit properties View objects
Splunk Product Guidance	splunk_product_guidance	1.0	Yes	No	App - Permissions	Enabled	Edit properties View objects View details on Splunkbase
Splunk RapidDag	splunk_rapid_dag	15.0	Yes	Yes	App - Permissions	Enabled	Launch app Edit properties View objects
Splunk Secure Gateway	splunk_secure_gateway	2.0.3	Yes	Yes	App - Permissions	Enabled	Launch app Edit properties View objects View details on Splunkbase
Universal Forwarder	splunkcloud	13.0	Yes	Yes	App - Permissions	Enabled	Launch app Edit properties View objects View details on Splunkbase
Yes	Yes		Yes	No	App - Permissions	Enabled	Edit properties View objects

5.7.6 Application Management

Indexer Clustering: Master Node Edit More Info Documentation

✓ All Data is Searchable
✓ Search Factor is Met
✓ Replication Factor is Met

5 searchable **0** not searchable Peers
 6 searchable **0** not searchable Indexes

Peers (5) Indexes (6) Search Heads (9)

filter 10 per page

Peer Name	Site	Fully Searchable	Status	Buckets
ip-10-0-1-100.ec2.amazonaws.com	site11	✓ Yes	Up	49
ip-10-0-1-101.ec2.amazonaws.com	site12	✓ Yes	Up	43
ip-10-0-1-102.ec2.amazonaws.com	site13	✓ Yes	Up	93
ip-10-0-1-103.ec2.amazonaws.com	site12	✓ Yes	Up	50
ip-10-0-1-104.ec2.amazonaws.com	site11	✓ Yes	Up	44

5.7.7 Cluster Master (Indexers)

Search Head Clustering Begin Rolling Restart

Monitor and take action on your search head cluster. [Learn more](#)

3 Members 20 per page

Name	Actions	Status	Role	Last heartbeat sent to captain
ip-10-0-1-100.ec2.amazonaws.com	actions	Up	Captain	22/04/2022, 22:59:26
ip-10-0-1-101.ec2.amazonaws.com	actions	Up	Member	22/04/2022, 22:59:27
ip-10-0-1-102.ec2.amazonaws.com	actions	Up	Member	22/04/2022, 22:59:27

5.7.8 Search Head Clustering (Search Heads)

Forwarder Management

Repository Location: [Puppet Enterprise Forwarder Management](#) Documentation

1 Client
PHONED HOME IN THE LAST 24 HOURS

0 Clients
DEPLOYMENT ERRORS

2 Total downloads
IN THE LAST 1 HOUR

Apps (2) Server Classes (1) Clients (1)

Phone Home: All All Clients filter

1 Clients 10 Per Page

ID	Host Name	Client Name	Instance Name	IP Address	Actions	Machine Type	Deployment Agent	Phone Home
1	ip-102-146-186-us-east-1	AJF0A8273-8423-4E48-8713-6482F4882963	ip-102-146-186-us-east-1-ajf0a8273-8423-4e48-8713-6482f4882963	10.0.19.211	Delete Record	Host-486_84	2 deployment	a few seconds ago

5.7.11 Forwarder management

Status

View the latest run status for your nodes and inspect recent corrective or intentional changes across your infrastructure. [Run puppet](#)

Updated: a minute ago

Total active nodes: **7,429** [Puppet Services status](#) [Radix](#)

Hide fact value filter

Nodes must match all rules.
 Nodes may match any rule.

Fact	Operator	Value	Matching nodes	
select fact	=	input exact value	-	Add
stackid	=	rkhakhkar-test7	14	Remove

14 Nodes run in enforcement

- 0 with failures
- 0 with corrective changes
- 0 with intentional changes
- 14 unchanged

0 Nodes run in no-op

- 0 with failures
- 0 would have corrective changes
- 0 would have intentional changes
- 0 would be unchanged

0 Nodes not reporting

- 0 unresponsive for ~28+ hours
- 0 have no reports

14 results | [Remove filter](#) [Export data](#) [Run](#)

Run status	No-op mode	Job ID	Last report	Node name
✓	-	-	2022-04-22 17:34 Z	ip-102-146-186-us-east-1-ajf0a8273-8423-4e48-8713-6482f4882963
✓	-	-	2022-04-22 17:33 Z	ip-102-146-186-us-east-1-ajf0a8273-8423-4e48-8713-6482f4882963
✓	-	-	2022-04-22 17:33 Z	ip-102-146-186-us-east-1-ajf0a8273-8423-4e48-8713-6482f4882963
✓	-	-	2022-04-22 17:32 Z	ip-102-146-186-us-east-1-ajf0a8273-8423-4e48-8713-6482f4882963
✓	-	-	2022-04-22 17:31 Z	ip-102-146-186-us-east-1-ajf0a8273-8423-4e48-8713-6482f4882963
✓	-	-	2022-04-22 17:30 Z	ip-102-146-186-us-east-1-ajf0a8273-8423-4e48-8713-6482f4882963
✓	-	-	2022-04-22 17:28 Z	ip-102-146-186-us-east-1-ajf0a8273-8423-4e48-8713-6482f4882963
✓	-	-	2022-04-22 17:27 Z	ip-102-146-186-us-east-1-ajf0a8273-8423-4e48-8713-6482f4882963
✓	-	-	2022-04-22 17:27 Z	ip-102-146-186-us-east-1-ajf0a8273-8423-4e48-8713-6482f4882963
✓	-	-	2022-04-22 17:27 Z	ip-102-146-186-us-east-1-ajf0a8273-8423-4e48-8713-6482f4882963
✓	-	-	2022-04-22 17:27 Z	ip-102-146-186-us-east-1-ajf0a8273-8423-4e48-8713-6482f4882963
✓	-	-	2022-04-22 17:25 Z	ip-102-146-186-us-east-1-ajf0a8273-8423-4e48-8713-6482f4882963
✓	-	-	2022-04-22 17:24 Z	ip-102-146-186-us-east-1-ajf0a8273-8423-4e48-8713-6482f4882963
✓	-	-	2022-04-22 17:23 Z	ip-102-146-186-us-east-1-ajf0a8273-8423-4e48-8713-6482f4882963

Previous **1** Next

5.7.12 Puppet

6. Testing

6.1 Testing Plan

The testing technique that is going to be used in the project is black box testing, that is expected inputs to the system are applied and only the outputs are checked.

6.2 Testing Cases

In all cases, we have checked that the system is working with all types of options. In this system the testing includes, running the Jenkins pipeline and ensure that the required scripts run and the expected task should properly be done

Following are the test cases :

Test Case ID	Req. ID	Test Steps	Expected Result	Actual Result	Pass/Fail
T1	R8	Jenkins run	Provision instances and Splunk install and clustering without failure	As Expected	Pass
T2	R1 R2	AWS instances Security Groups	Security groups should be created as defined under specified AWS account	As Expected	Pass
T3	R3	Package fetch from S3	Fetching of data successfully download from S3 (.tgz)	As Expected	Pass

T4	R4 R5	Deploying App	App deployment on instance and all packages should be downloaded	As Expected	Pass
T5	R6	Replicate Data to all indexers	SF/RF should Met and No Fix-up Tasks	As Expected	Pass
T6	R7	App Data searchable	Deployed App should be searchable from UI and monitored using search head	As Expected	Pass

Table 6.2.1 Testing Cases

7. Conclusion and Future Extension

7.1 Conclusion

The proposed system works efficiently for creation of AWS instances. It also configures one of the AWS instances as a server and deploys applications on it. Moreover on the other instances Splunk Cluster is installed and configured to receive data. The server is configured to forward data. Thus we have all the data in Splunk and can be monitored from there.

7.2 Future Extension

- It can be extended by including monitoring of Splunk instances using Nagios so that we can know if any Splunk instance goes down.
- Automatic error resolving can be implemented (Self-Healing Architecture)
- Auto-scaling group can be configured for indexer cluster
- More user input parameters can be enabled.

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Offer Letter

Date: April 25, 2022

Dear Darshil,

We are pleased to offer you the position of "Associate Programmer" at Creole Studios by Creole Ventures Pvt. Ltd. We feel confident that you will contribute your skills and experience to the growth of our organization.

As per the discussion your Joining date will be **May 02, 2022** and your Annual Total Employment Cost to the Company (CTC) will be **INR. 3,00,000 P/A- (Three Lakh)**.

Please confirm your acceptance of this offer by signing and returning a copy of this offer letter. Any changes will be communicated to you in writing.

We are happy to welcome you to the Creole family.



Authorized Signatory and Stamp

Date: April 25, 2022

M/s. Creole Studios

Office Address: A404, Ratnakar Nine Square, Opp Keshavbaug Party Plot, Vastrapur,
Ahmedabad, India 380015

By: Creole Ventures Pvt. Ltd.

Quiz Mobile Application

By

Darshil Sakhiya (91800133001)

Prof. Kapil Shukla

A Project Report Submitted to
Marwadi University in partial fulfillment of the requirements for the
Bachelor of Technology
In
Information and communication Technology

(April 2022)



Marwadi
University

MARWADI UNIVERSITY

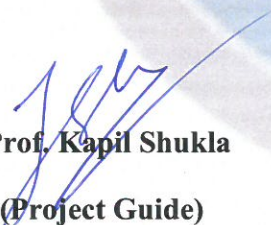
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CERTIFICATE

This is to certify that the research/project work embodied in this dissertation titled “**Quiz Mobile Application**” was carried out by **Darshil Sakhiya** at **Marwadi University** for partial fulfillment of **B.Tech in Information and Communication Technology** to be awarded by Marwadi University. This research/project work has been carried out under my guidance and supervision and it is up to my satisfaction.

Date: 28/04/2022

Place: Marwadi University


Prof. Kapil Shukla
(Project Guide)


Prof. Chandrasinh Parmar
(Head of Department)

COMPLIANCE CERTIFICATE

This is to certify that research/project work embodied in this dissertation titled “**Quiz Mobile Application**” was carried out by **Darshil Sakhiya (91800133001)** at Marwadi University for partial fulfillment B.Tech to be awarded by Marwadi University. He has complied to the comments given during Review I, Review II, Review III,... by Reviewer to my satisfaction.

Date: 28/04/2022
Place: Marwadi University

D.R. Sakhiya

(Darshil Sakhiya)

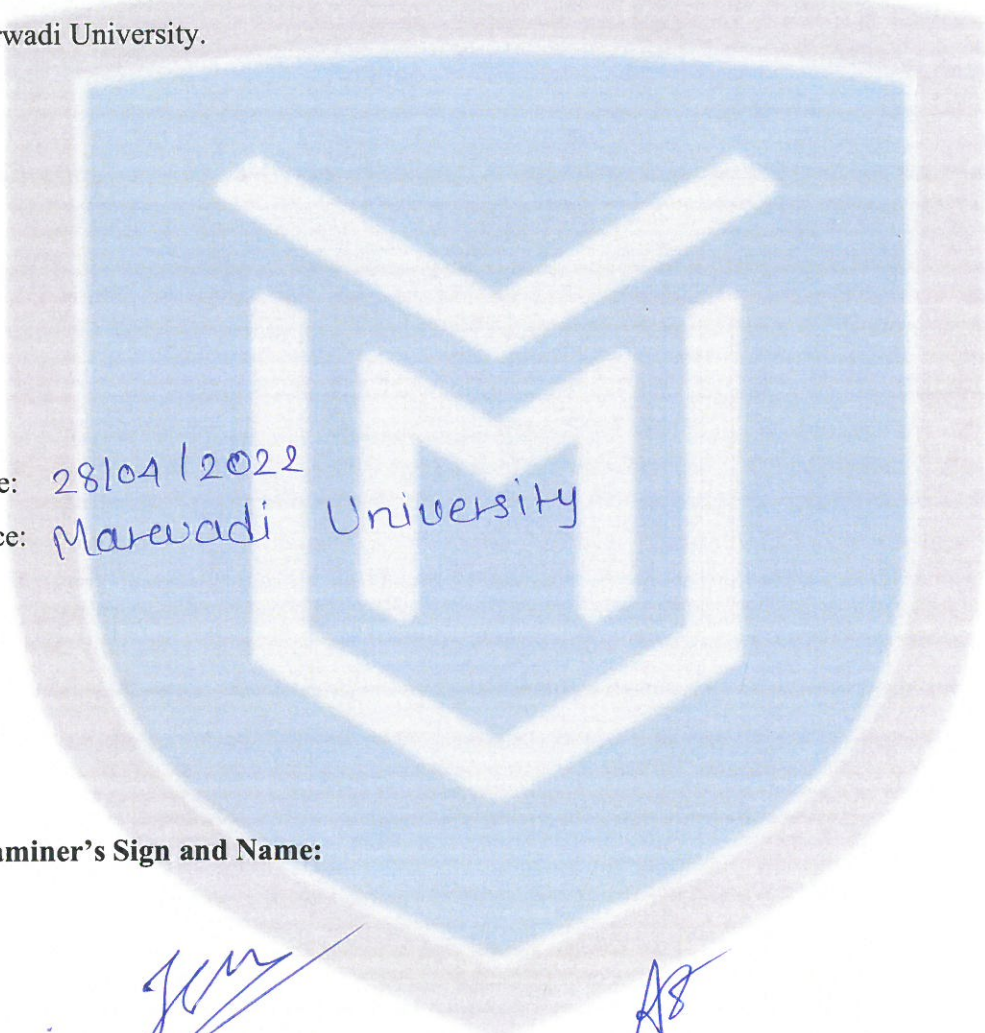
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Kapil Shukla

(Prof. Kapil Shukla)

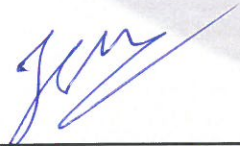
PROJECT APPROVAL CERTIFICATE

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Date: 28/04/2022
Place: Marwadi University

Examiner's Sign and Name:



(Prof. Kapil Shukla)



(Dr. Anjan Barua)

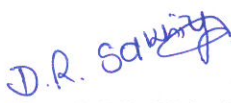
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We hereby certify that we are the sole authors of this thesis/project work and that neither any part of this thesis nor the whole of the thesis has been submitted for a degree to any other University or Institution.

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(Prof. Kapil Shukla)

Acknowledgements

I have taken efforts in this project. However, it would not have been possible without the kind support and help of many hands. I would like to extend my sincere thanks to all of them.

I am highly indebted to Prof. Kapil Shukla for his guidance and constant supervision as well as for providing necessary information regarding the project & also for his support in completing the project.

I am grateful to my external guide Mr. Nirmalsinh Rathod and Mr. Vijay Kahar in Creole studios for giving me the support and encouragement that was necessary for the completion of this project.

I would like to express my gratitude to H.O.D. Prof. Chandrasinh Parmar and I am also grateful to all my faculty members at Marwadi University for their kind cooperation and encouragement which help me in the completion of this project and preparing the report.

Last but not the least, I would also like to thank my colleagues, who have cooperated during the preparation of my report and without them, this project has not been possible. Their ideas helped me a lot to improve my project report.

Thank you,

Darshil Sakhiya (91800133001)

Abstract

This project mainly consist of mainly four modules as any quiz application will required this four modules Authentication, Quiz, Admin dashboard and user dashboard. Main purpose of this project to leaning the standard development process in real world.

In Authentication it has been taken care that data of user should be secure and there should be no redundant data of same user. User dashboard there is two-part quiz screen and result screen. It also includes list of quiz which is added by admin. In admin dashboard admin is able to keep track of users, scores and quizzes. In quiz module there are list of question with option will be render one by one and there is limited time of attempting quiz with skip functionality. Especially in this module I have to take care to avoid bugs ex. User cannot select two options at time.

I have to also changed to logic of application two or three time for better outcomes and for future enhancement and I have given my best efforts to make this application user friendly and fluent.

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Chapter 1 Introduction

1.1. Overview:

The “Quiz Application” project will be developed to overcome the time-consuming system problem. Other than that, in the current system, checking the answer sheets after the test, wastes the testers' time, so this app will test the correct answer and save the tester's time and conduct the test effectively. Users using this system do not need advanced computer information and the system will notify them when entering invalid data.

The purpose of this project is to compile an existing manual system and help testers save their valuable time and valuable data. Apart from this, the data available in this system, will be available for a long time and will be easily accessible. This project helps testers to manage their services more efficiently and provide better service to their users.

The purpose of this project is to manage student information, exams, marks, courses, and papers effectively. The operation of the application will be fully controlled by the administrator and the administrator can ensure that anyone can access it. The project will streamline the hands-on process of managing trials and all related issues.

The project activities will be as follows:

- Administrator can handle questions with the student's ingenuity.
- Appropriate answers will be evaluated according to plan.
- At the end of the questions, the user will get points for specific questions.
- Users can quite the quiz anytime.
- A timer will be shown in the quiz after a specific time quiz will be submitted automatically.
- The administrator can check the result of the quiz.
- The administrator can change the quiz status from active to non-active and vice versa.

We intend to design and build this project such that it can handle many types of users without requiring any management. After a successful login, the first software in the project collects

the student's information. Login as a teacher or a student to use the project. As a system administrator, the user will be able to effectively manage student questions and observe the status of all students. When a person logs in as a student, he or she will be able to choose specific tests and test questions based on those tests. After completing the test and submitting it, the user will receive a notification stating that the test was completed successfully, and the system will not allow the user to repeat the same test again. A user who logs in as a student will also be able to see the results of the tests he or she takes.

1.2. Objective:

The primary goal of the "Quiz Application" is to provide a user-friendly environment for all users while also reducing manual work. In the past, quizzes were conducted manually, but with the advancement of technology, we are now able to compute scores automatically. The functional requirements include the creation of quiz participants, automatic score and report production, and administrative operations such as add, delete, and update for users with admin privileges. The administrator has complete control over this application, including defining the quiz's details and determining whether or not the results will be visible to the interviewee, adding questions and answers, assigning marks to each question, setting a timer for each quiz, and generating a report with the quiz's score.

These objectives in this project.

- Creating an adequate framework for the most effective management of MCQ tests.
- To get over the time-consuming problems and take MCQ tests.
- To release the test taker's results as quickly as feasible.
- To keep track of the results of several testing.

1.3. Scope:

As Education is transform digitally and people are getting more aware to technology this kind of Platform play major role in education and learning. The main advantage is taking online quiz makes it possible to have a large number of participants. Up to 1000 participants (and more!). It does not matter what kind of environment they respond to online questions as long as they are online.

Scope of React native as a mobile app development technology is very vast because of its cross-platform Functionality, Code reusability and native component.

1.4. Tools & Technology:

For developing this project, I am using React native.

React Native: -

- React Native (also known as RN) is a popular JavaScript-based mobile app framework that allows you to build natively-rendered mobile apps for iOS and Android. The framework lets you create an application for various platforms by using the same codebase.
- React Native was built based on React – a JavaScript library, which was already hugely popular when the mobile framework was released.

JavaScript: -

- JavaScript (js) is a light-weight object-oriented programming language which is used by several websites for scripting the webpages.
- It is an interpreted, full-fledged programming language that enables dynamic interactivity on websites when applied to an HTML document.
- It was introduced in the year 1995 for adding programs to the webpages in the Netscape Navigator browser. Since then, it has been adopted by all other graphical web browsers.

Visual Studio Code: -

- Visual Studio Code is freeware source-code editor for Windows, Linux and macOS. Features include for debugging, Syntax highlighting, intelligent code completion and snippets and embedded git.

Firebase: -

- Firebase is a platform developed by Google for creating mobile and web applications. Provide built in function and libraries to integrate with react native and easy to manage data with good user interface.

Chapter 2. Project Management

Project management is the discipline of starting, planning, executing, regulating, and ending a team's work to meet defined goals and deadlines.

2.1. Project planning and scheduling:

2.1.1 Project planning:

- Project planning is a subset of project management that relates to the use of schedules like Gantt charts to plan and report progress within a project setting.
- The project scope is defined first, followed by the best methods for completing it.
- The goals of the project have been established. Following this, the durations for the various jobs that must be completed are calculated.
- A work breakdown structure is used to list and organize the tasks that must be done.
- Various aspects of a project, including project management, are routinely coordinated using project planning.

2.1.2 Project scheduling:

- Project scheduling is the culmination of a planning process that is an important part of software project management.
- A project management road map is created when scheduling is combined with estimation methodologies and risk analysis.
- The beginning point for scheduling is the process composition. The features of the project are used to adapt a task set that is suited for the job at hand.
- The important project path, a time line chart, and other project data are all generated using the task network.

2.2 Project development approach:

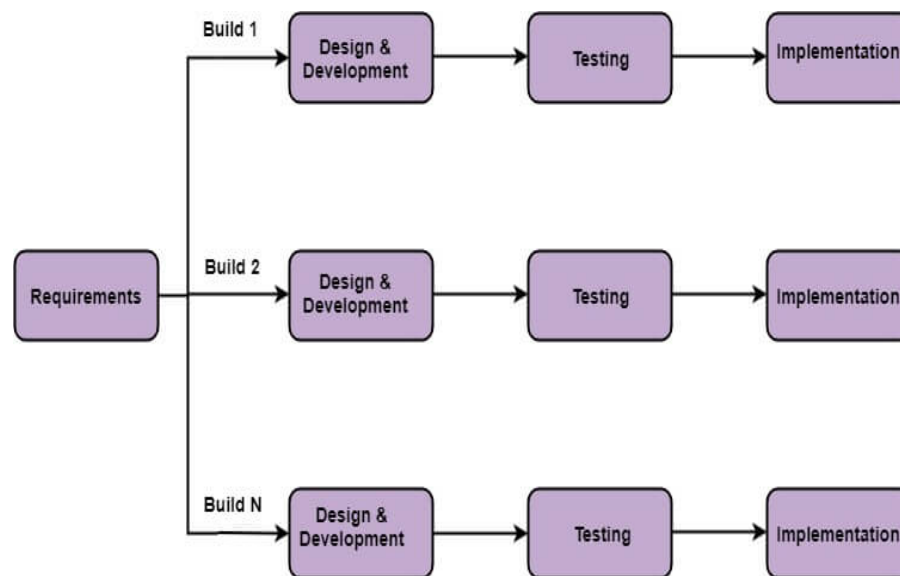


Figure 1. The incremental software process model

The following are the phases of the incremental model:

1. Requirement analysis:

The product analysis expertise identifies the requirements in the first phase of the incremental model. The requirement analysis team also understands the system's functional requirements. This phase is critical for developing software using the incremental methodology.

2. Design & Development:

The design of the system functionality and the development technique are completed successfully in this phase of the Incremental model of SDLC. The incremental model employs style and development phase when software creates new functionality.

3. Testing:

The testing step of the incremental approach examines the performance of each current function as well as new capabilities. Various approaches are utilized to test the behavior of each task throughout the testing phase.

4. Implementation:

The coding phase of the development system is enabled by the implementation phase. It entails the final code that was created throughout the designing and development process, as well as the testing of the functionality. Following the completion of this phase, the number of working products is increased and updated all the way to the final system product.

Incremental model is used when there are below possibilities:

- When the requirements are more stringent.
- A project's development takes a long time.
- When the software crew is under-skilled or under-trained.
- When a customer requests a speedy delivery of a product.
- You might start by creating prioritised requirements.

Activity	Start Date	End Date
Preliminary Investigation	3/1/2022	13/1/2022
Requirement Analysis	16/1/2022	31/1/2022
Designing	1/2/2022	20/2/2022
Implementation	21/2/2022	26/3/2022
Testing	27/3/2022	10/4/2022

Report	11/4/2022	22/4/2022
--------	-----------	-----------

Table 1. Project plan

2.3 Milestone and Deliverables:

- In this project, I went through step by step, first I learnt JavaScript then React native.
- After that I started designing authentication module.
- After competing it I started with the design of User module. Then I design quiz module.
- After completing the Quiz module in user, I started the admin module design.
- Along with that I manage database in firebase.
- After that I got changes in requirement based on that I changed my project, so that I got real scenario of professional life of software engineer.

Software Process Activity	Milestones
Project Plan	Project Schedule
Requirement Collection	User requirements
Data Flow Analysis	System Flow
Design <ul style="list-style-type: none"> 1. Database Design 2. User Interface Design 3. System Design 	System Design Document
Implementation <ul style="list-style-type: none"> 1. Code for giving security 2. Code for reports 	Access Reports
Testing	Setting validation and error message

Table 2. Milestones and Deliverables

2.4 Roles and Responsibilities:

1. Preliminary studies
2. Requirement Analysis
3. DB Design
4. Coding
5. Testing

Chapter 3. System Requirements Study

3.1. User Characteristic:

This application is related with two sorts of users.

1. Admin:
 - Admin can change the status of the quiz from active to inactive and vice-versa.
 - Manage the quiz status for particular student.
 - Show the result of each student and each attempt.

2. Student:
 - After attempting quiz student can show result of test.
 - Student can attempt active quiz any time.

3.2. Hardware and Software Requirements:

3.2.1 Hardware Requirements:

- RAM: 4.0 GB
- Processor: Intel core i3 CPU @ 3.4GHz
- System type: 32-bit Operating System
- Input Device: Mouse, Keyboard

3.2.2 Software Requirements:

- Operating System: Android Device, iOS Device
- Development Tools: Visual Studio Code, Postman, Fiddler

3.3. Assumption and Constraint:

- It is assumed that the user has an Active AWS account and user have some basic knowledge of Jenkins.

-
- User must be familiar with the cloud terminologies that are related to DevOps.

3.3.1 Regulatory Policies:

- Regulatory policies or mandates limit an individual's or an agency's discretion or otherwise compel particular sorts of behavior.
- When good behavior can be simply defined and bad behavior can be easily regulated and punished by fines and punishments, these policies are regarded to be most effective.

3.3.2 Hardware Limitation:

- The portal's seamless operation is mostly determined by the hardware's speed, followed by the internet's speed.
- When it comes to hardware, it is always a good idea to stay current. If the user is still utilizing a CPU with a low MHz or a RAM of less than 128Mb, the hardware constraint will occur.
- This will reduce the portal's overall functionality, as well as waste a lot of time, energy, and resources.

Chapter 4. System Analysis

4.1. Study of Current System and Requirement of this System:

- There are some quiz apps which allows tutor to create and add quiz on the app and end user can take a quiz and check their knowledge.
- Some apps offer services to schools or collages so that they can take online tests or exams.
- From those apps some of are not cross-platform and with latest technologies.
- In this app I am using React native platform to build the app.
- By using react-native app we can make native app with cross platform functionality, which make less costly and feasible to developer or we can say client, end react-native also provide best UI options.
- In this system there are some requirements or we I can say functionalities like, quiz automatically close if time is complete, admin can deactivate quiz that quiz user cannot perform etc.

4.2. Operational Feasibility:

- The operational feasibility of a given system is a measure of how successfully it addresses problems.
- This system is solving all the problem given by company.
- This system meets all the requirement criteria that the app should have to enhance user experience.

4.3. Technical Feasibility:

- The formal process of determining whether it is technically possible to manufacture a product or service is known as technical feasibility.
- Examine the operational necessities.
- Conduct a preliminary feasibility analysis for production.
- We also conduct a preliminary development assessment.
- Calculate the cost of an engineering prototype.

4.3.1 Functional Requirements:

Authorization:

- Phone number sign-In used for authentication using firebase.
- The already registered number will not be able to sign up again.
- After successful verification of mobile, number the user has to provide some personal information like name, email, phone number (non-editable), address, etc.
- More than one device cannot log in using the same account.

Admin Dashboard:

- List of quizzes listed on admin dashboard.
- Admin can change the status of the quiz from active to inactive and vice-versa.
- Admin can check the quiz result.
Admin can filter the result using the particular score.

User Dashboard:

- List of quizzes listed on the user dashboard.
- Only an active quiz can be taken by the user.
- Can take a quiz for one time only.
- Can check the result of previous quizzes.

Quiz:

- User cannot take the same quiz again.
- Users can change the question to previous or next.
- Users can quite the quiz anytime.
- A timer will be shown in the quiz after a specific time quiz will be submitted automatically.
- At the end of the quiz, user will get the score of the particular quiz.

4.3.2 Non-Functional Requirements:

- Usability: The user interface should use phrases and concepts derived from the experience of those who will be using the system the most.
- Efficiency: The portal should allow for easy and quick access without incurring additional costs.
- Readability: The system's behavior should never surprise the user, and it should also provide meaningful feedback when a mistake occurs so that the user can recover.
- Accuracy: The user should demand that the data collected from the database and stored in the database be correct.
- Security: The user desires that the data contained in the database be secure and inaccessible to unauthorized users.
- Maintainability: The user expects the system to be easily maintainable, which means that if modifications are needed, they can be made quickly.

4.4. Schedule Feasibility:

Schedule feasibility refers to whether or not there is enough time to execute the project aspect in question:

- The project's schedule
- The deadline by which the project must be finished
- Period of reporting

4.5. Economic feasibility:

- Economic feasibility is a measure of a project's or solution's cost effectiveness.
- The benefits from the project should exceed or be at least equivalent to the cost of development before the system can be declared economically feasible.

4.6. Function of the System:

Admin side:

-
1. Phone number with OTP login
 2. Phone number and OTP validation
 3. Register page with validation
 4. Registration successful prompt
 5. Logout
 6. One time login
 7. Quiz results of all the students
 8. Management of quiz with particular students
 9. Graph analysis

User side:

1. Phone number with OTP login
2. Phone number and OTP validation
3. Register page with validation
4. Registration successful prompt
5. Logout
6. One time login
7. Quiz result attempt wise
8. One time quiz attempt
9. Show correct answer if press wrong answer by student

Database Side:

1. Authentication database
2. Quiz module
3. User module
4. Result module

4.7. Use-Case:

- A use case is a collection of steps in software and systems engineering that define interactions between actors and systems in order to achieve a goal.
- A human, an external system, or time can be the actor.

- Use cases are utilized at a higher level in systems engineering than they are in software engineering, and they frequently represent missions or stakeholder goals.
- The detailed requirements can then be expressed as contractual declarations or in Systems Modeling Language.
- Use cases have been widely employed in modern software engineering for the past two decades as a key requirement technique.
- Use case driven development is a crucial feature of process models and frameworks, and because of its iterative and evolutionary nature, it's a strong fit for agile development.

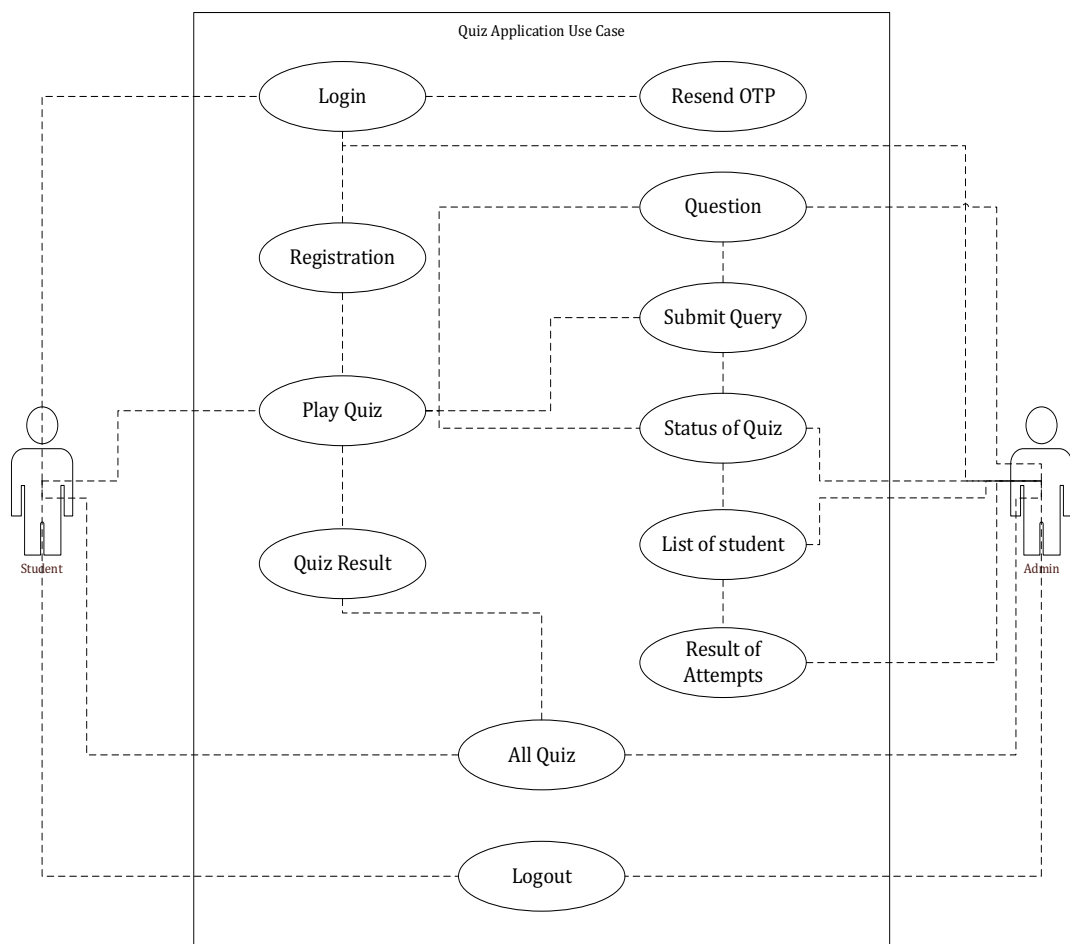


Figure 2. Use case diagram

4.8. Activity Diagram:

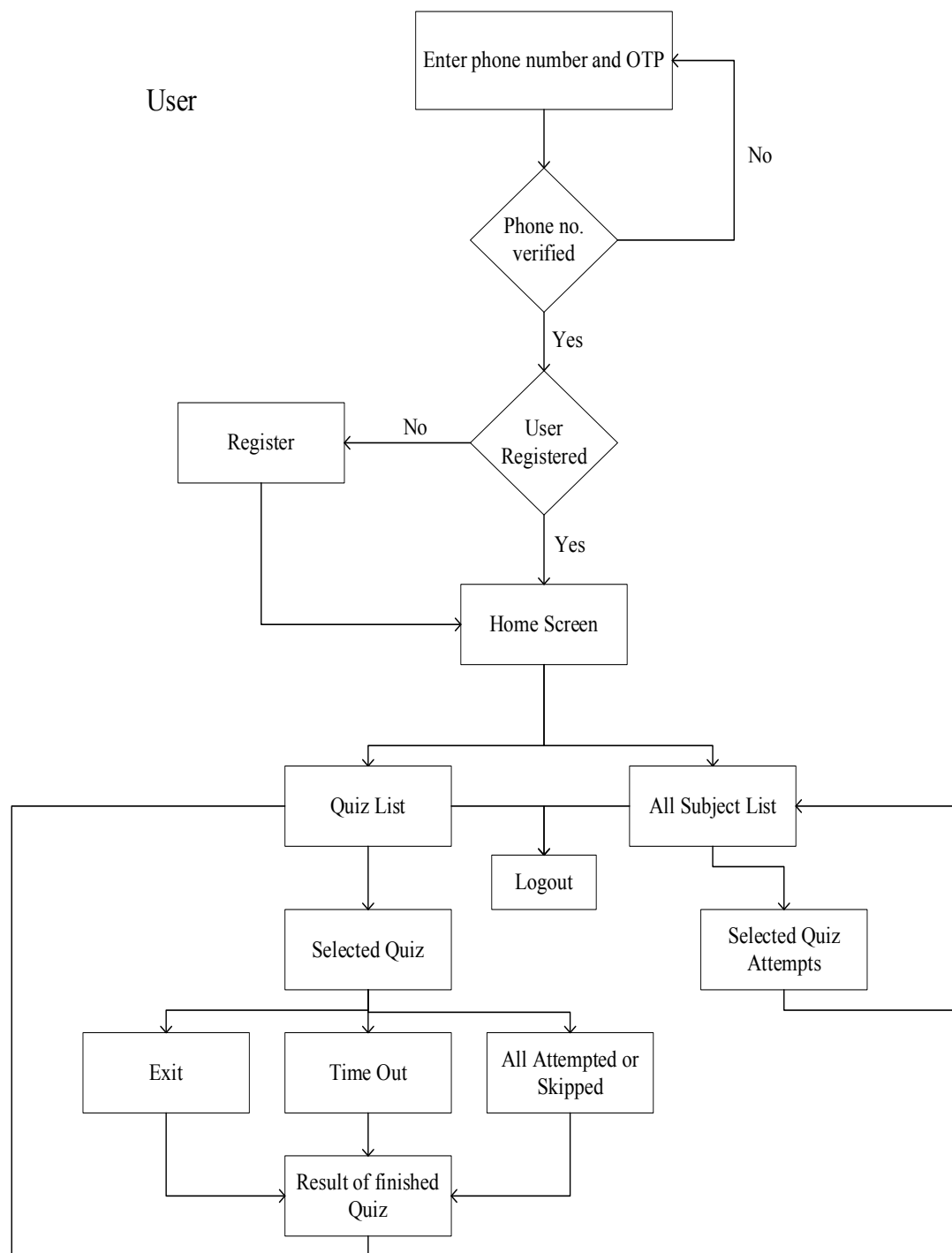


Figure 3. Activity diagram for user

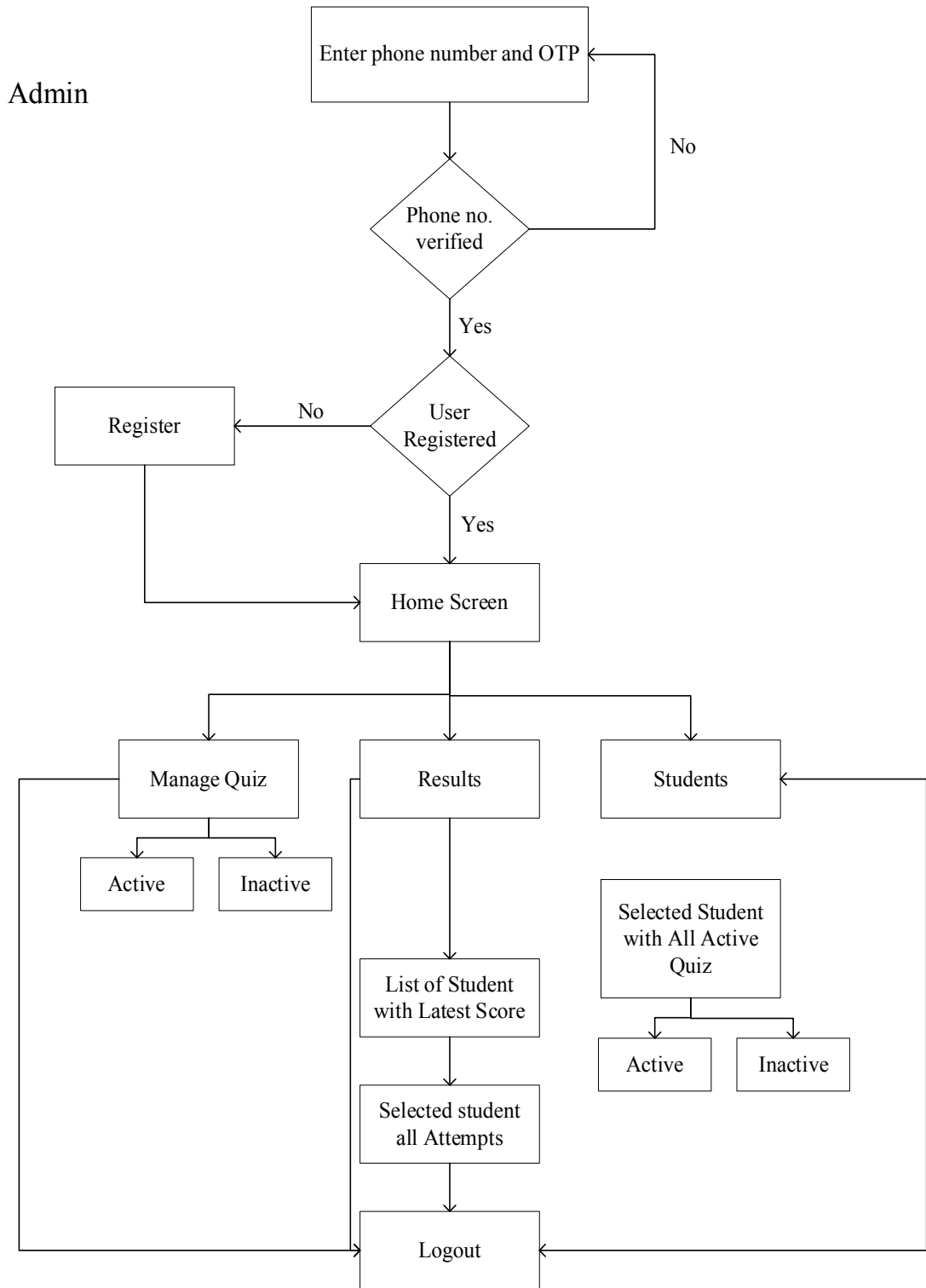


Figure 4. Activity diagram for Admin

4.9. Sequence Diagram:

- Under the name Sequence Diagram, the well-known Message Sequence Chart approach has been incorporated into the Unified Modeling Language (UML) diagram.
- A sequence diagram depicts multiple processes or objects that exist at the same time as parallel vertical lines, and the messages that are passed between them as horizontal arrows, in the order in which they occur.
- This enables for the graphical specification of simple runtime scenarios.
- Under the name Sequence Diagram, the well-known Message Sequence Chart approach has been incorporated into the Unified Modeling Language (UML) diagram. A sequence diagram depicts multiple processes or objects that exist at the same time as parallel vertical lines, and the messages that are passed between them as horizontal arrows, in the order in which they occur. This enables for the graphical specification of simple runtime scenarios.

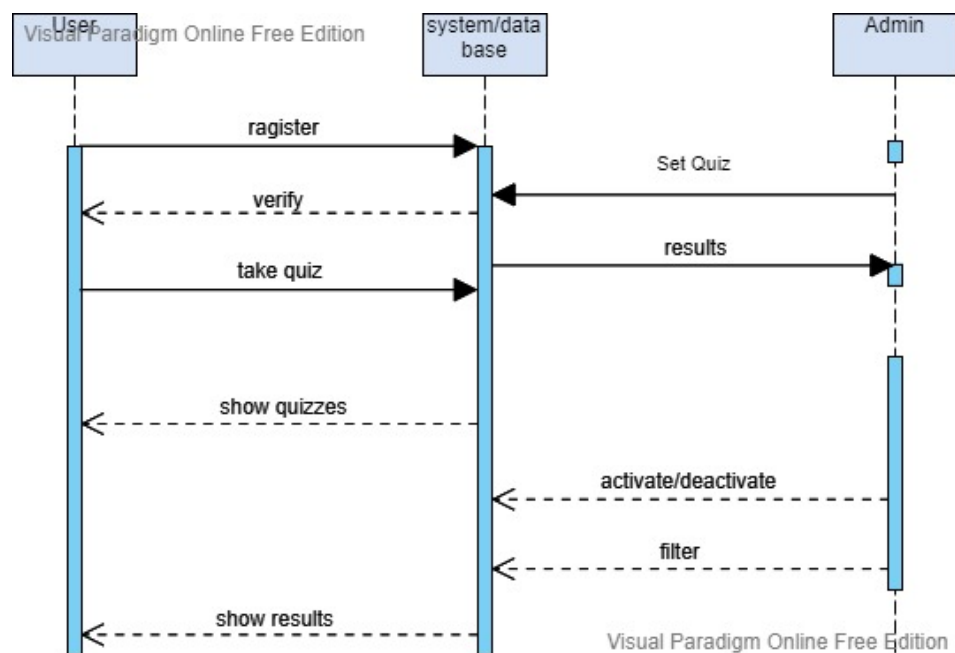


Figure 5. Sequence diagram

4.10. Data Modeling:

4.10.1 E-R Diagram:

- An entity–relationship model (ER model) is a data model used in software engineering to describe the data or information parts of a business domain or its process requirements in an abstract way that can be implemented in a database like a relational database.
- Entities and the relationships that can exist between them, as well as databases, are the core components of ER models. An entity–relationship model is a method of describing and modelling a business process in a systematic manner.
- The process is represented as a set of components (entities) connected by relationships that explain the dependencies and requirements between them, such as: one building can be partitioned into zero or more apartments, but each apartment can only be found in one building.
- Entities can have a number of different properties (attributes) that define them.
- Entity–relationship diagrams are diagrams that are used to graphically describe these entities, properties, and relationships.

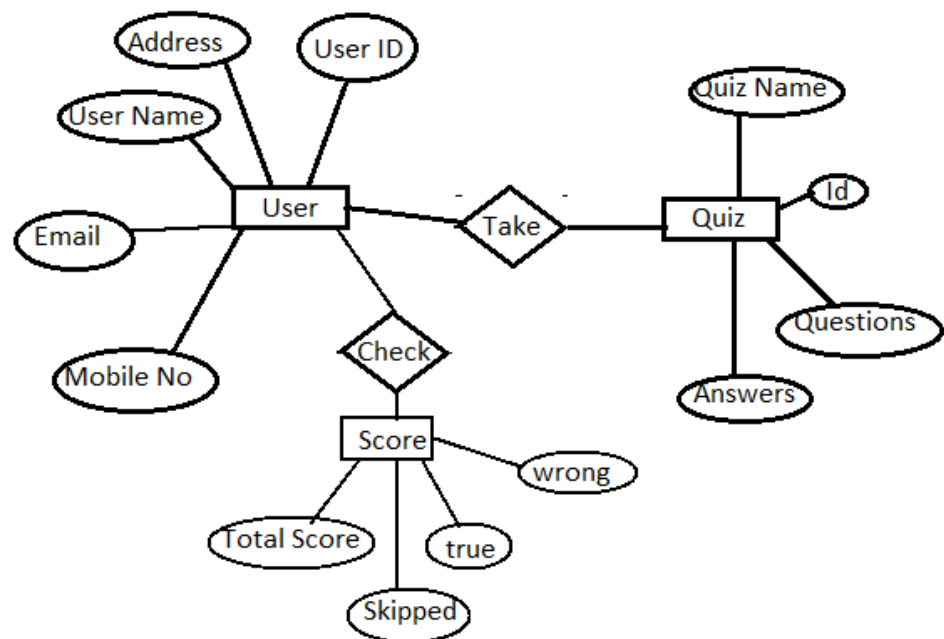


Figure 6. E-R diagram

4.10.2 Class Diagram:

- A class diagram in the Unified Modeling Language (UML) is a form of static structural diagram used in software engineering to depict the structure of a system by displaying the system's classes, properties, operations (or methods), and interactions between objects.
- The class diagram is an essential component of object-oriented modelling.
- It is used for both overall conceptual modelling of the application's architecture and detailed modelling of the models' translation into programming code.
- Data modelling can also be done with class diagrams. In a class diagram, the classes reflect both the major objects and interactions in the application, as well as the classes that need to be programmed.

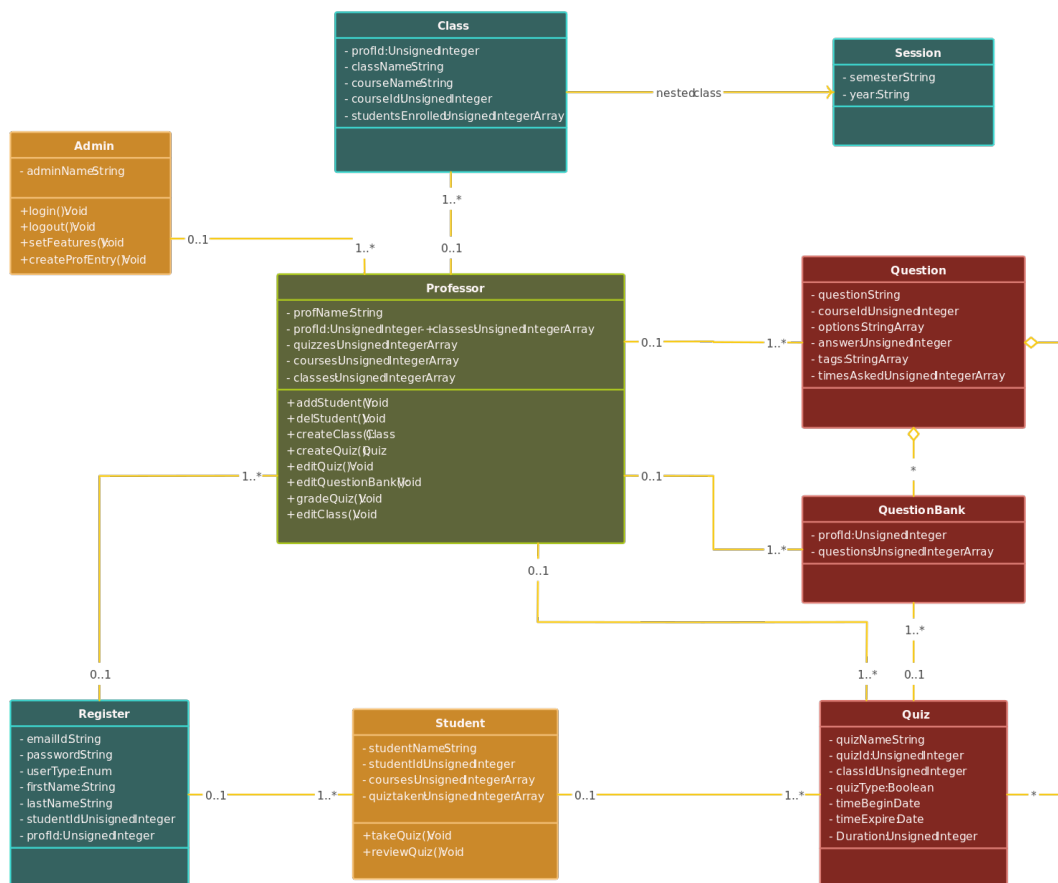


Figure 7. Class diagram

4.11 Modules and Their Description of System:

The following are the four primary modules:

Authorization:

- Phone number sign-In used for authentication using firebase.
- The already registered number will not be able to sign up again
- After successful verification of mobile, number the user has to provide some personal information like name, email, phone number (non-editable), address, etc.
- Validation of phone number and OTP.

Admin Dashboard:

- List of quizzes listed on admin dashboard
- Admin can change the status of the quiz from active to inactive and vice-versa.
- Admin can check the quiz result.
- Graph analysis.

User Dashboard:

- List of quizzes listed on the user dashboard.
- Only an active quiz can be taken by the user.
- Can take a quiz for one time only.
- Can check the result of previous quizzes.

Quiz:

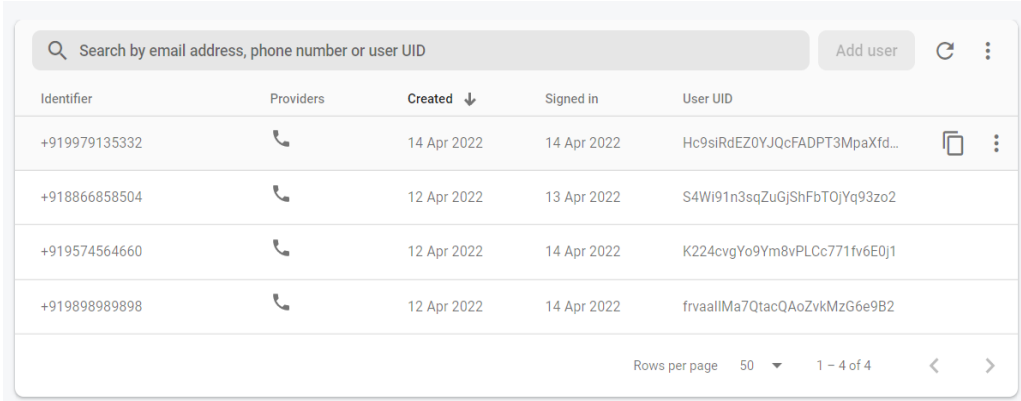
- User cannot take the same quiz again.
- Users can change the question to previous or next.
- Users can quite the quiz anytime.
- A timer will be shown in the quiz after a specific time quiz will be submitted automatically.
- At the end of the quiz, user will get the score of the particular quiz.

Chapter 5. System Design

- The process of establishing the architecture, components, modules, interfaces, and data for a system in order to meet specific criteria is known as systems design.
- The System Design Description report gives a summary or thorough description of a model-based system design. As a result, systems design is the process of defining and developing systems to meet the user's specific requirements.

5.1. Database Design/Database Structure Design:

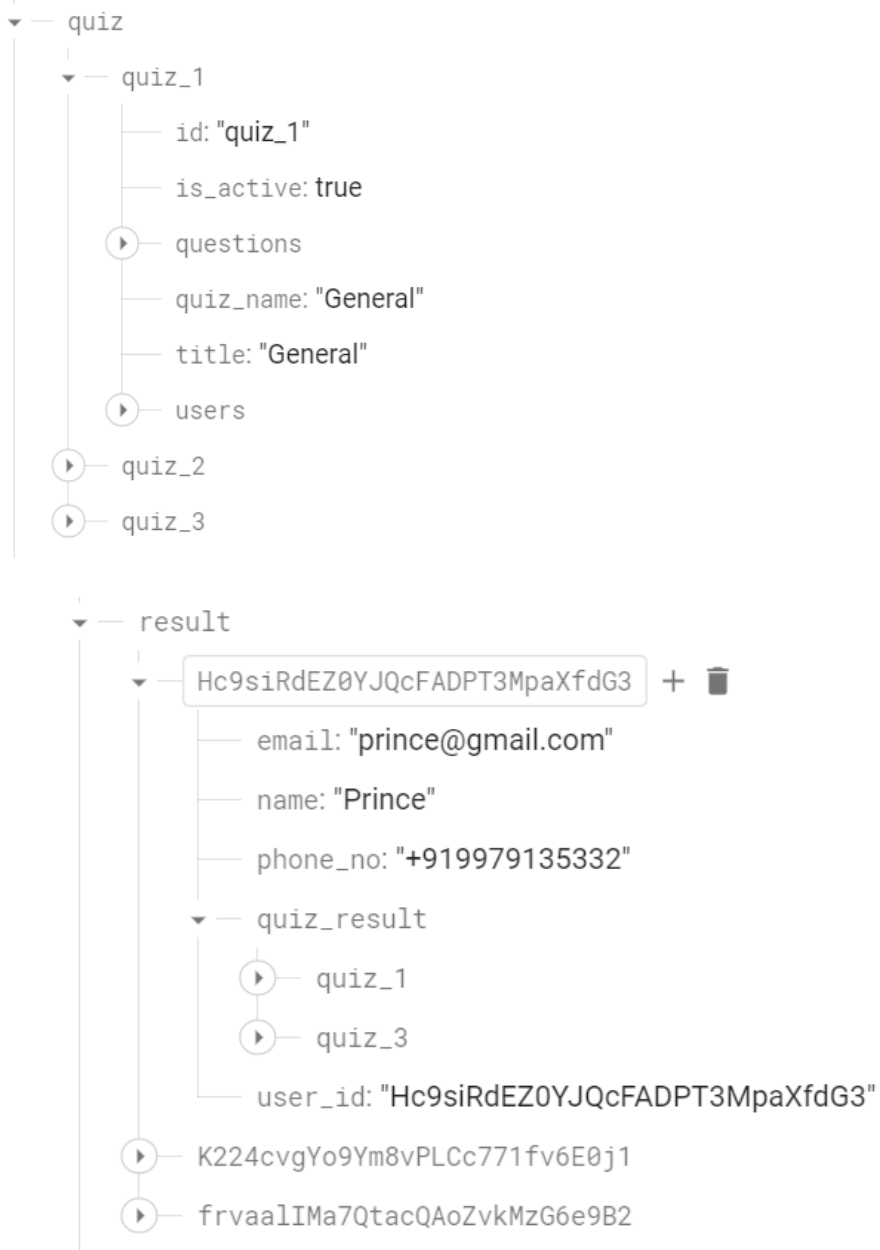
For Database I am using firebase, Firebase is a platform developed by Google for creating mobile and web applications. In order to save the required data, in this project I am using Real-time database and mobile authentication.



The screenshot shows the Firebase console interface for user management. It features a search bar at the top with the placeholder text "Search by email address, phone number or user UID". To the right of the search bar are buttons for "Add user", a refresh icon, and a menu icon. Below the search bar is a table with the following columns: "Identifier", "Providers", "Created", "Signed in", and "User UID". The table contains four rows of user data. At the bottom right of the table, there is a pagination control showing "Rows per page 50" and "1 - 4 of 4" with navigation arrows.

Identifier	Providers	Created ↓	Signed in	User UID
+919979135332	📞	14 Apr 2022	14 Apr 2022	Hc9siRdEZ0YJQcFADPT3MpaXfd...
+918866858504	📞	12 Apr 2022	13 Apr 2022	S4Wi91n3sqZuGjShFbTOjYq93zo2
+919574564660	📞	12 Apr 2022	14 Apr 2022	K224cvgYo9Ym8vPLCc771fv6E0j1
+919898989898	📞	12 Apr 2022	14 Apr 2022	frvaalIIma7QtacQAOzvkMzG6e9B2

https://creole-quiz-6ae46-default-rtdb.asia-southeast1.firebaseio.com/





Chapter 6. Implementation and planning details

6.1. User Base:

The environment will allow a user to access the system from anywhere. Each user can attend the quizzes which are available in application with admin permission and they can see the results of attempted quizzes. This all functionality can be used from anywhere and they can access from anytime and many numbers of user can access this application only they require network connectivity for start the quiz and the permission required from admin.

6.2. User Interface:

The user needs to add phone number and OTP from securely login in application. If the user is first time in application, then they need to add the register details like full name, email and address. If user is admin, then he/she can manage the quizzes of application. He/she can manage the quiz student wise. Admin can see the results of student and graph analysis. After work done admin can logout anytime. If admin is student, then user can attempt the quiz which are activated by admin. After that user can see the result of quizzes with attempts and after work done admin can logout anytime. So, this is the main user interface of the portal.

6.3. Functional components:

In React Native are JavaScript functions that render a React element. They can accept a single argument which is an object containing component properties. They can also use state and lifecycle behavior with hooks.

6.4. Naming Conventions:

- The names of folders and subfolders should always begin with small letters, and the files that belong to the folders should always be written in pascal case. The term "Pascal Case" derives from software development and can be used to denote any compound word with the first letter capitalized.
- We use the path-based component naming method to name the components, which involves naming the component according to its relative path to the folder components or to the app. A component that may be found in components/common/Button. Button.js would be the name of the js file. The component name should be written in capital letters.
- We don't need to repeat the name if the file is in a folder with the same name. That is, UserForm would be titled instead of UserFormForm in components/user/form/Form.js.
- Include all of the controls from the same module in a single import and terminate with a semicolon. Between two imports, there should be no space.

6.5. Sample Coding:

```
/* eslint-disable react-native/no-inline-styles */  
  
/* eslint-disable no-shadow */  
  
import React, { useEffect, useState } from 'react';  
  
import { View, FlatList, TouchableOpacity, LogBox } from 'react-native';  
  
import database from '@react-native-firebase/database';  
  
import style from './style';  
  
import { useWindowDimensions } from 'react-native';  
  
import { STRING } from '../assets/utility/string';  
  
import { ListEmptyComponent } from '../components';  
  
import { Toastforall } from '../components';  
  
import { SimpleText } from '../components';  
  
import { useSelector } from 'react-redux';
```

```

const Quiz = ({ navigation }) => {

  const windowHeight = useWindowDimensions().height;

  const [data, setData] = useState();

  const [allResult, setAllResult] = useState(null);

  LogBox.ignoreAllLogs();

  const userID = useSelector((state) => state.userID);

  useEffect(() => {

    database()

    .ref(`/result/${userID}/quizResult`)

    .once('value', (snapshot) => {

      setAllResult(snapshot.val());

    });

  }, [userID]);

  useEffect(() => {

    database()

    .ref('quiz')

    .on('value', (snapshot) => {

      console.log(userID);

      var array = [];

      snapshot.forEach((childSnapshot) => {

        var key = childSnapshot.key;

        var data = childSnapshot.val();

        if (childSnapshot.hasChild(`users/${userID}`)) {

```

```

        array.push({
            key: key,
            Id: data.id,
            Name: data.title,
            Active: data.is_active,
        });
    }
});

setData(array);
});
}, [userID]);

const checkActive = (item) => {
    if (item.Active === true) {
        database().ref(`quiz/${item.Id}/users/${userID}`).remove();
        console.log(item);
        navigation.reset({
            index: 0,
            routes: [
                {
                    name: 'QuizScreen',
                    params: { selectedQuiz: item.Id, subjectName: item.Name, windowWidth:
windowWidth },
                },
            ],
        });
    }
};

```

```

    });
  } else {
    <Toastforall title={STRING.ATTEMPTED} />;
  }
};

const renderItem = ({ item }) => {
  var disabled;
  if (allResult) {
    var attend = Object.values(allResult).filter((subject) => subject);
    var arrayAttend = [];
    attend.forEach((sub) => arrayAttend.push(sub.Subject));
    disabled = arrayAttend.includes(item.Name);
  }
  return (
    <TouchableOpacity
      disabled={disabled || !item.Active}
      onPress={() => checkActive(item)}
    >
    <View
      style={[
        style.viewHorizontal,
        { opacity: item.Active && !disabled ? 1 : 0.5 },
      ]}
    >

```

```
>
  <SimpleText
    mainStyle={style.item}
    textStyle={style.font}
    text={item.Name}
  />
</View>
</TouchableOpacity>
);
};

return (
  <View>
    <FlatList
      data={data}
      ListEmptyComponent={() => {
        return <ListEmptyComponent msg={'No Quiz Found'} />;
      }}
      renderItem={renderItem}
    />
  </View>
);
};

export default Quiz;
```

Chapter 7. Testing

Testing is a procedure for demonstrating the program's correctness. Testing is required to demonstrate completeness, improve software quality, and give maintenance assistance. As a result, some testing standards are required to reduce testing costs and time. Testing software takes place throughout the coding process and is the final check of setups, design, and coding. We can determine whether the configuration that has been developed is study or not based on how the software reacts to these tests. All components of an application are tested, because failing to do so leads to a slew of bugs once the software is in use.

7.1. Testing Plan:

The main goal of test plan is to include all the details related to testing such as what to test, when to test, how to test and who will be the tester. Test plan is often not updated but if there is some new feature or change is introduced then it has to be updated accordingly.

7.2. Testing Strategy:

A test strategy is a diagram that outlines the software development cycle's testing technique. It was intended to provide project managers, testers, and developers with information about some of the most important aspects of the testing process. This comprises the testing objective, new function testing methodologies, total project duration and resources, and the testing environment.

7.3. Testing Methods:

Branch Testing: Each branch of application that is corporate dealing solution is working correctly and navigation take place easily.

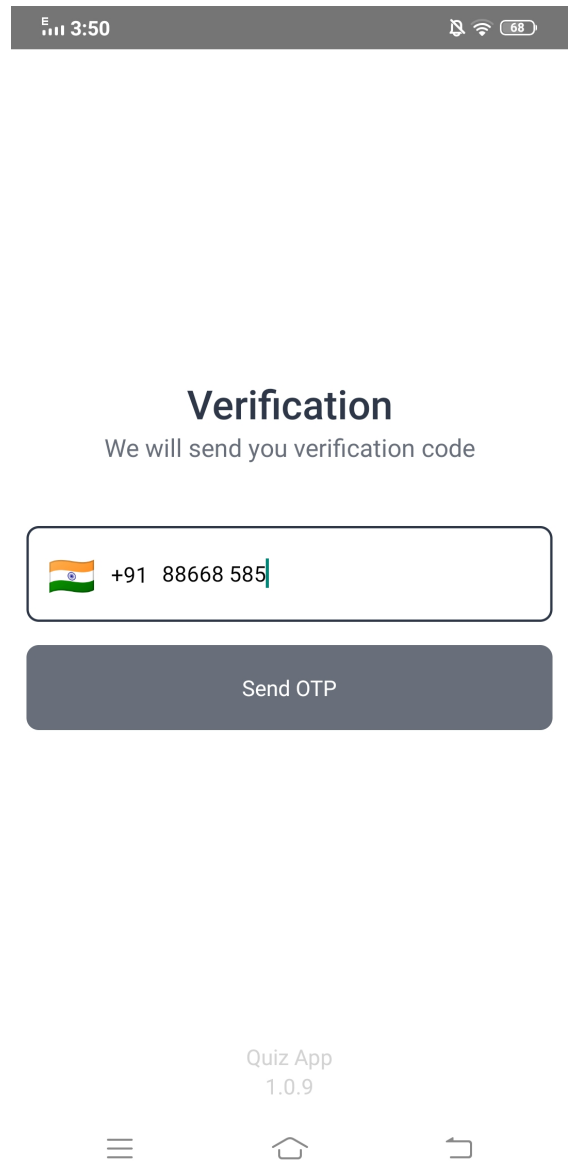
Bottom-up Testing: We tested each part separately and then integrated in them into appropriate modules and testing is done also at module level and at the end each and every

module are integrated with each other for complete functionality of system. Entire system then tested by many users to find out bugs.

System Work Performance Testing: System work performance testing is done by many users for appropriate working of application and to remove problem will may possibly face by user.

Chapter 8. Screenshots

8.1. Authentication Module:



Verification

We will send you verification code

+91 98989 89898

Send OTP

Quiz App
1.0.9



Filter


- Afghanistan +93
- Åland Islands +358
- Albania +355
- Algeria +213
- American Samoa +1684
- Andorra +376
- Angola +244
- Anguilla +1264
- Antigua and Barbuda +1268
- Argentina +54

CLOSE



Verification

We will send you verification code

 +91 98989 89898

Send OTP



Quiz App
1.0.9



Enter the OTP

The OTP will be sent to +91 95745 64660

Submit OTP

Resend OTP



Enter the OTP

The OTP will be sent to +91 98989 89898

1	2	3	4	5	6
---	---	---	---	---	---

Submit OTP

Resend OTP

Welcome to the Quiz

Register to continue

Full name
Enter your full name

Mobile number
+91 88668 58504

Email
Enter your email

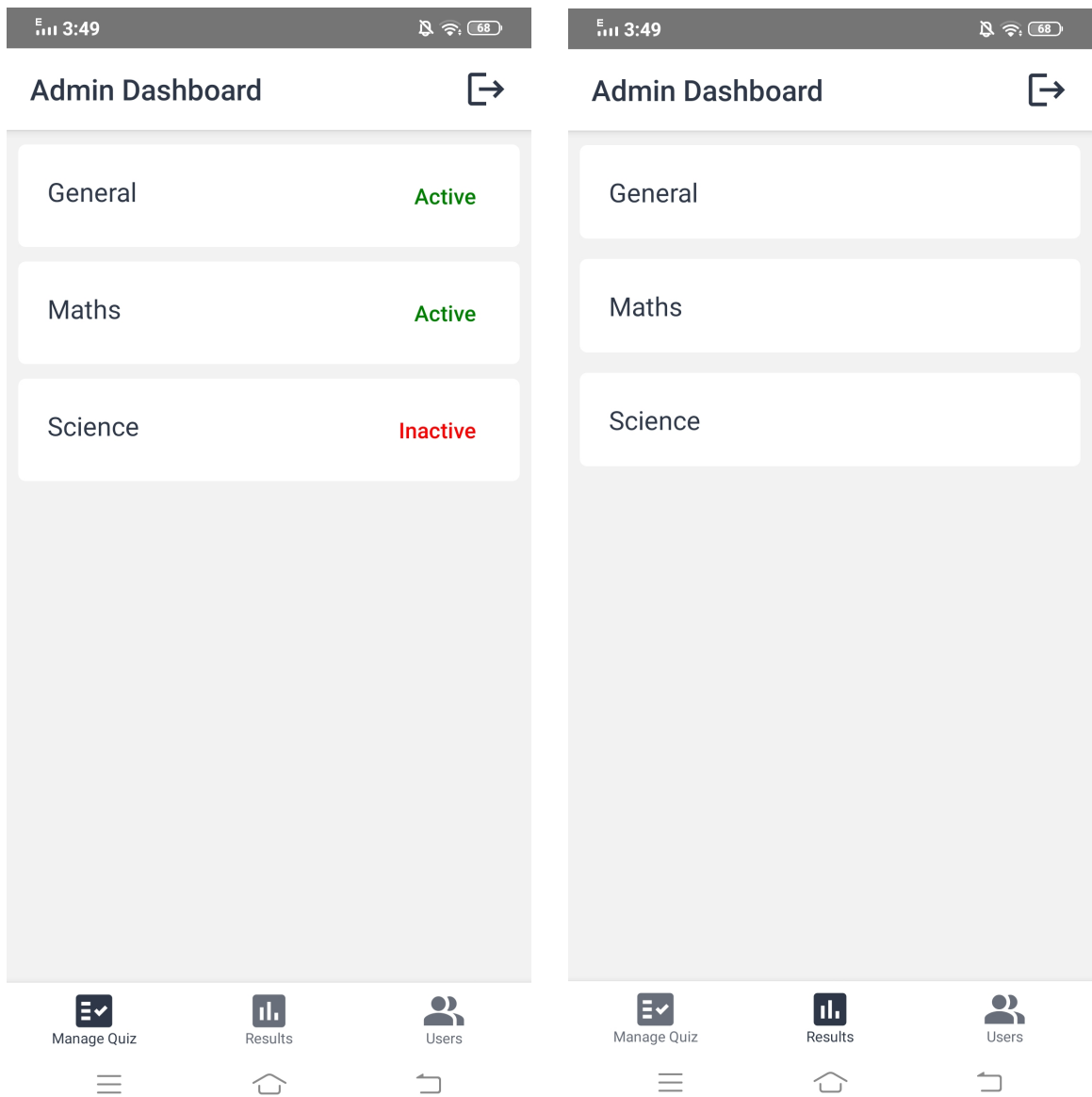
Address
Enter your address

Register



Figure 9. Authentication module

8.2. Admin Module:



Admin Dashboard



Prince

Darshil

Admin

Manage Quiz

Results

Users



Users Result



Min. Mark 6	Average Mark 6.50	Max. Mark 7
-----------------------	-----------------------------	-----------------------

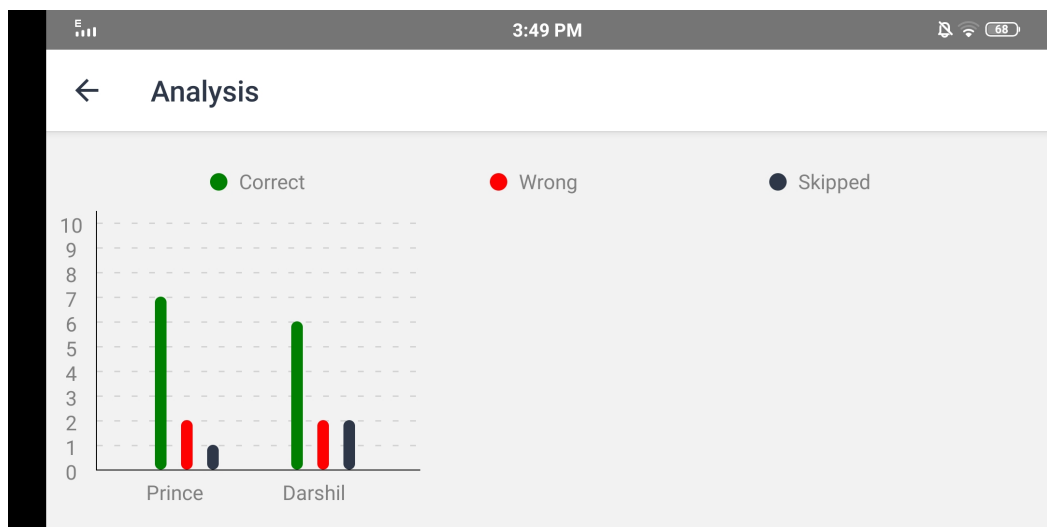
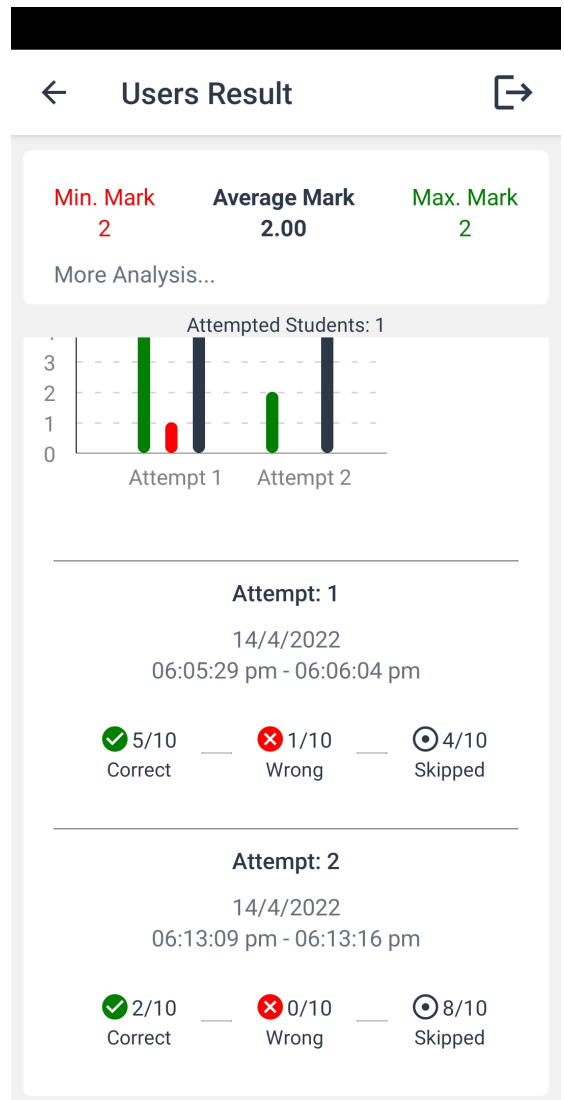
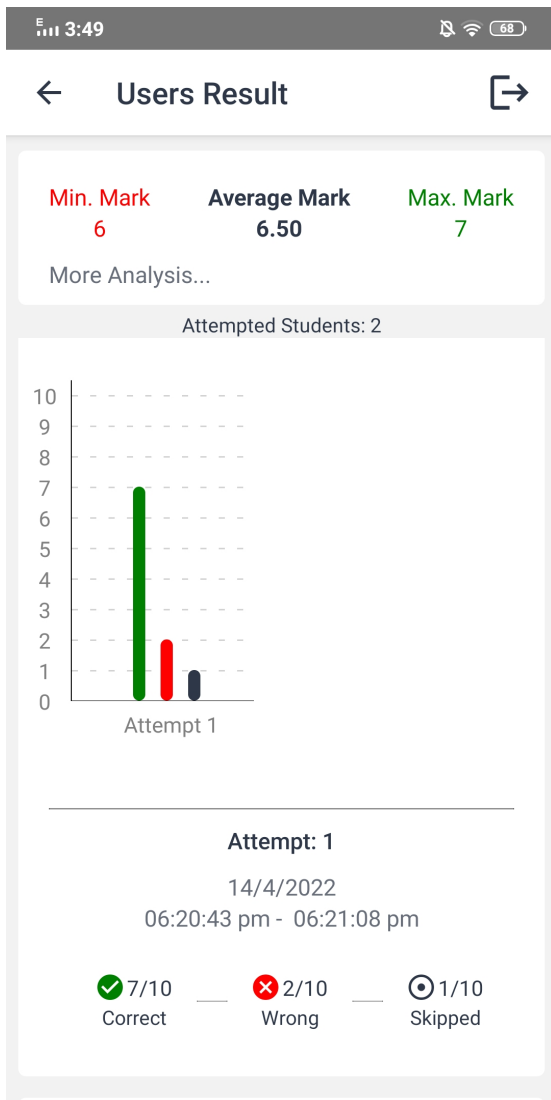
More Analysis...

Attempted Students: 2

Name: Prince
Latest Score: 7

Name: Darshil
Latest Score: 6





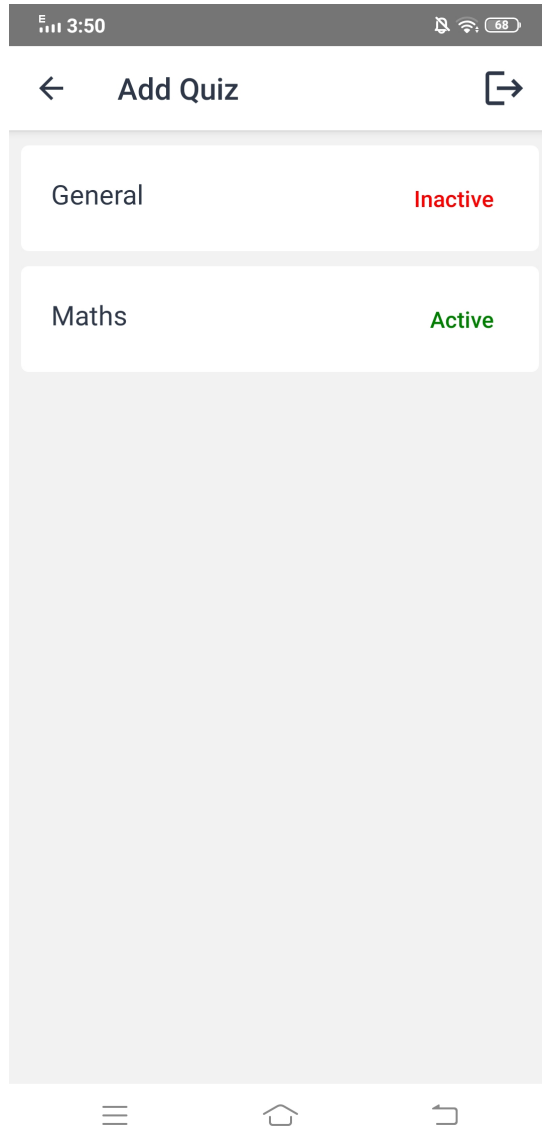
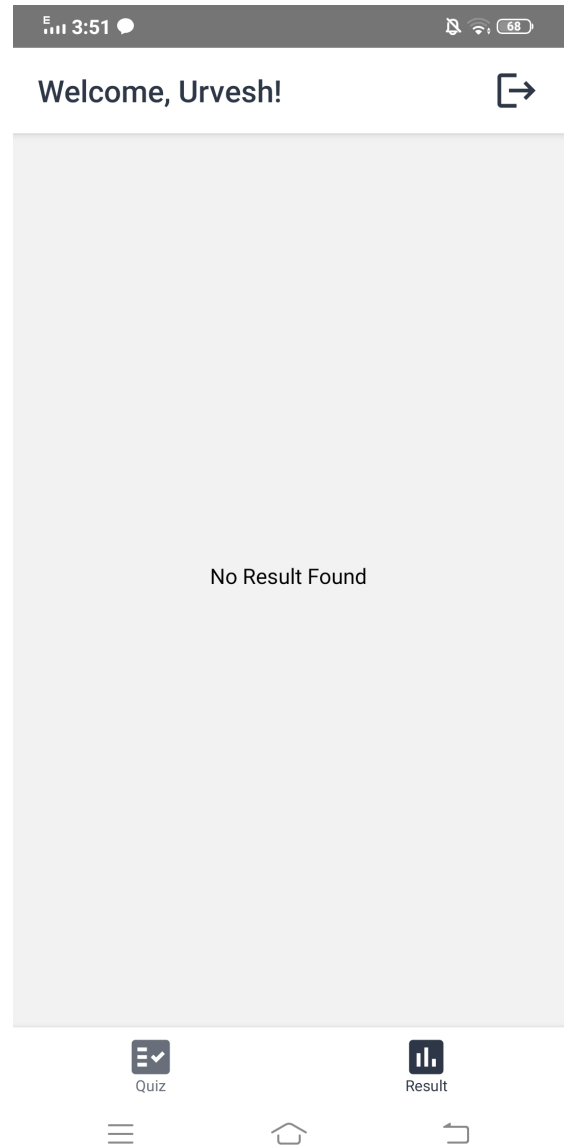
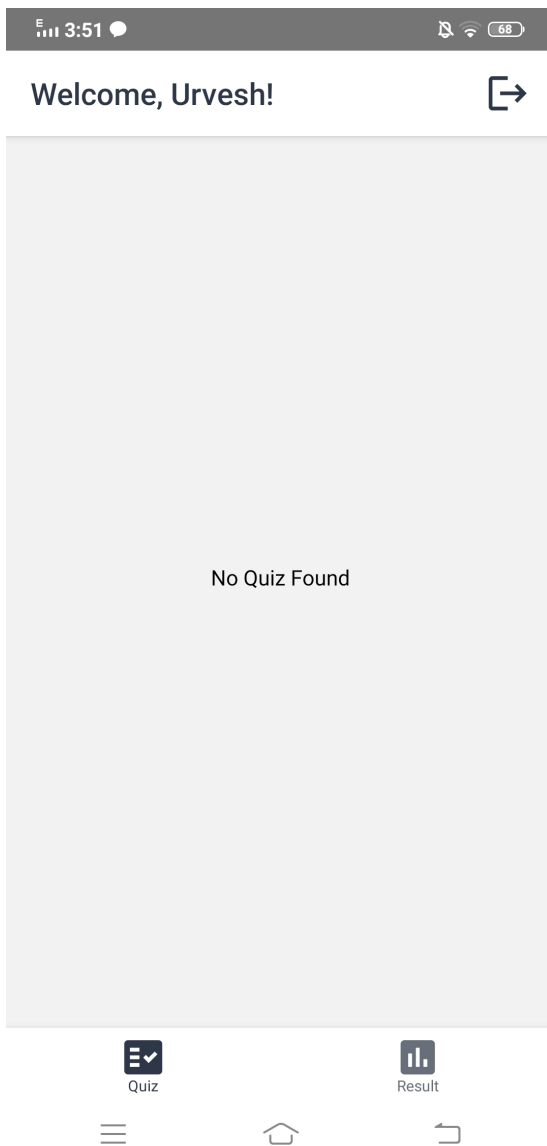
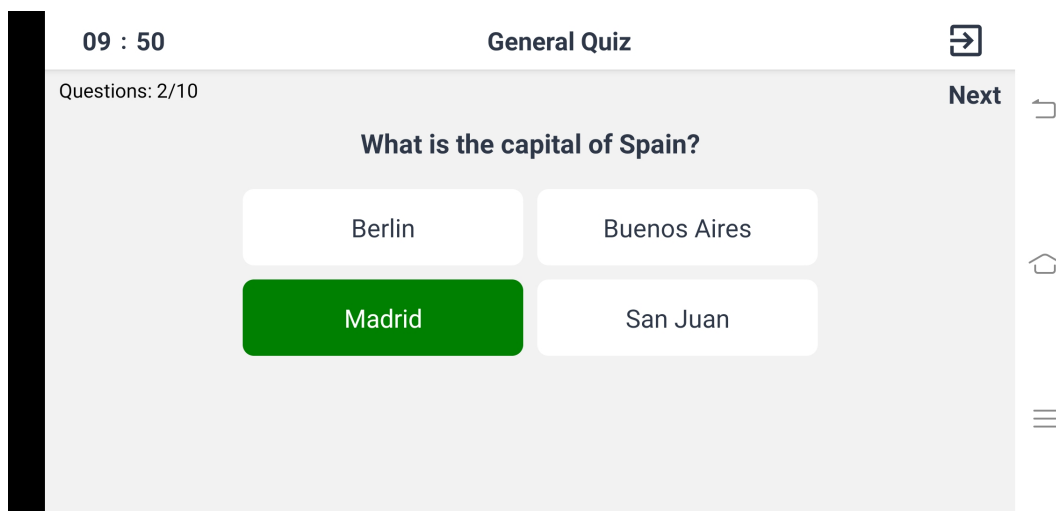
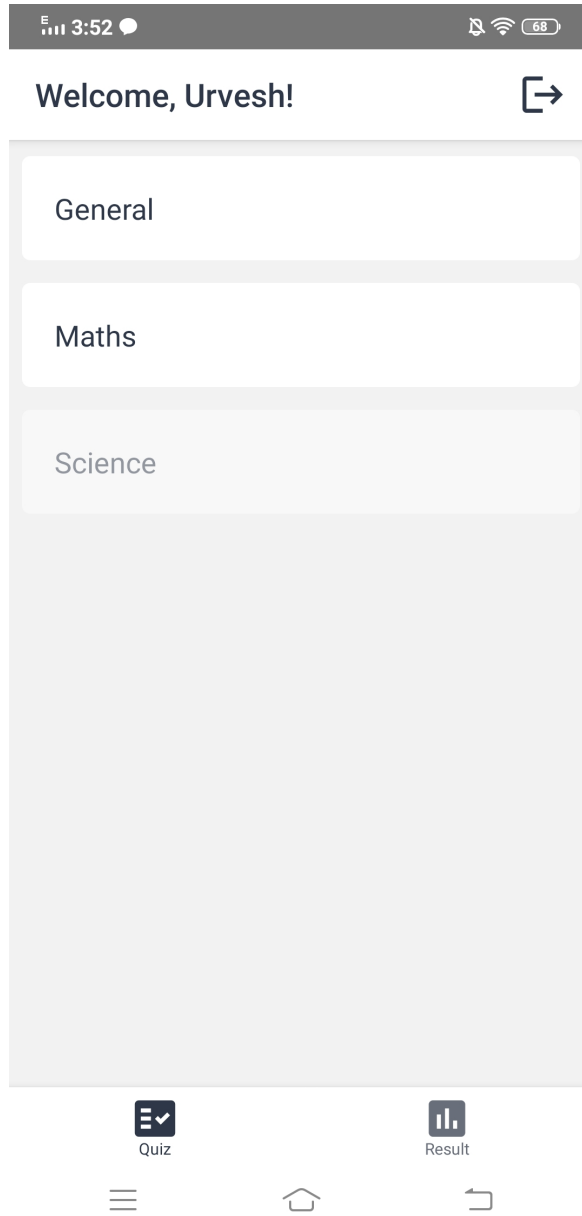


Figure 10. Admin module

8.3. Student Module:





09 : 38

General Quiz



Questions: 3/10

Next

Which of the following kernel is used in Android?

MAC

Windows

Linux

Other



09 : 45

General Quiz



Questions: 4/10

Next

Which of the following kernel is used in Android?

MAC


Windows

Linux

Other



General Quiz



Your Score
2/10

✔ 2/10
Correct

✘ 2/10
Wrong

○ 6/10
Skipped

Back to home



Attempts

Maths Quiz

Attempt	Score	14/4/2022
1	5	06:05:29 pm - 06:06:04 pm

Attempt	Score	14/4/2022
2	2	06:13:09 pm - 06:13:16 pm



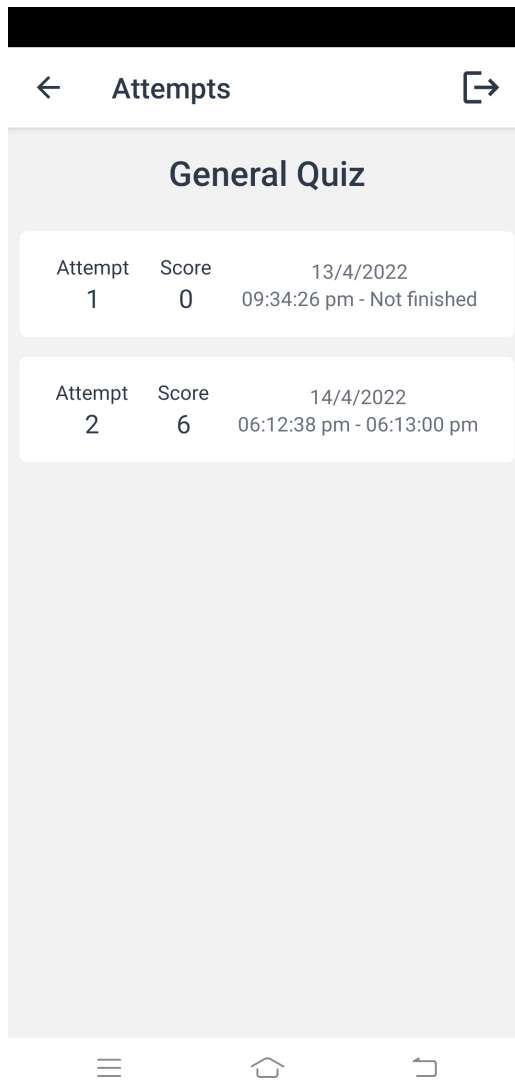


Figure 11. User module

Chapter 9. Limitations

9.1. Limitations of current System:

- Due to slow internet speed its takes time to load the quiz and questions.
- Quiz management is difficult if there are thousands of students.
- Due to technical issues of device application doesn't work properly.
- Login only depends on phone number.
- Due to network issue OTP will not receive.

9.2. Enhancement:

- Increase the analysis of result.
- Showing the list of correct and wrong answer with question.
- More than one device cannot log in using the same account.
- Admin can filter the result using the particular score.
- Create the student group class or standard wise.

Chapter 10. Conclusion

The project's major goal was to provide the platform to overcome the time-consuming system problem. Other than that, in the current system, checking the answer sheets after the test, wastes the testers' time, so this app will test the correct answer and save the tester's time and conduct the test effectively. Users using this system do not need advanced computer information and the system will notify them when entering invalid data.

The second prime goal of this application is to create users that are going to participate in the quiz, automatic score and report generation and administrative tasks active and inactive the quizzes for admin privilege users and people are getting more aware to technology this kind of Platform play major role in education and learning. The main advantage is taking online quiz makes it possible to have a large number of participants. It does not matter what kind of environment they respond to online questions as long as they are online.

Chapter 11. References

11.1 References:

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Offer: Trainee - Software Development
Ref: IRSPL/Ahmedabad/
Date: September 8, 2021

Mr. Darshit Ambasana
Marwadi University
Ahmedabad, India

Offer Letter & Terms of Employment

Dear Darshit Ambasana

It is always a great pleasure, extending offer to enthusiastic candidates like yours. We are pleased to appoint you in our organization as **"Trainee - Software Development"** at a monthly Stipend of Rs.10,000/- (Rupees Ten Thousand Per Month Only) for our registered office in Ahmedabad.

Upon successful completion of your training program as well as your ongoing campus program, you will be qualified to assign your duties as Junior. Software Developer at Ahmedabad Office with Ishitva Robotic Systems Private Limited. Your compensation package (CTC) after completion of training program will be determined based on your performance and it may be in the range INR 3.6/- Lakh/year (Minimum CTC) to INR 5.0/- Lakh/year (Maximum CTC). You will be issued a Letter of Appointment as Junior. Software Developer, with the compensation details upon confirmation.

We would like to thank you for your interest in seeking a career with our organization and look forward to having you in our team.

For Ishitva Robotic Systems Private Limited

Adlani

Authorized Signatory

Darshit

Ishitva Robotic Systems Private Limited
CIN: U72900GJ2018PTC103821

Registered Address:
36, Tulip Bunglows - 2
Nr. Goyal Intercity, B/H. Drive-In-Cinema,
Thaltej Ahmedabad Gujarat 380054

Correspondence Address:
208, Kalasagar Shopping Hub,
Opp Saibaba Temple
B/h Sattadhar Bus-stand., Ahmedabad, Gujarat 380061



Terms of Employment

Training Program:

- Level 1: C++ Project
- Level 2: OpenCV and C++ - Image Read/Write/Display
- Level 3: QT Training Forms /Signal and Slots
- Level 4: QT with Hardware/Sensors /Database
- Project responsibilities during training period:
 - Designing, implementing, testing, evaluating and managing software programs
 - Identifying areas for modification in existing programs and subsequently developing these modifications
 - Writing and implementing efficient code
 - Determining operational practicality
 - Developing quality assurance procedures
 - Deploying software tools, processes, and metrics
 - Maintaining and upgrading existing systems
 - Working closely with other developers, UX designers, business and systems analysts

Relevant experience

As per the recommendation of our management review panel, out of your total experience, 0 year is being relevant to the business of our organization.

Probation period

After completion of your training period, you will be on probation for three months (90 Days). Your confirmation will be communicated to you in writing.

IRSPL reserves the right to terminate your employment in case your performance, behavior and/ or conduct during the probation period is found unsatisfactory.

Working hours

You will be required to observe the normal business hours for 9 hours working (currently 9:30 AM to 6:30 PM from Monday through Friday and 9:30 AM to 1:30 PM on Saturdays) during regular business days. However, depending on business requirement, you may be required to work in shifts and/ or in extended working hours, as permitted by law. You may be required to work beyond existing normal business hours depending upon the business requirements, exigencies from time to time, without any extra remuneration / compensation.

Mobility

IRSPL reserves the right to transfer/ utilize your services at any of its offices, work sites, or associated or affiliated companies in India, or outside India, on the terms and conditions as applicable to you at the time of transfer.

Ishitva Robotic Systems Private Limited

CIN: U72900GJ2018PTC103821

Registered Address:

36, Tulip Bunglows - 2
Nr. Goyal Intercity, B/H. Drive-In-Cinema,
Thaltej Ahmedabad Gujarat 380054

Correspondence Address:

208, Kalasagar Shopping Hub,
Opp Saibaba Temple

B/h Sattadhar Bus-stand., Ahmedabad, Gujarat 380061

Date: July 25, 2022

Mr. Darshit Ambasana
Jr. Software Developer
Ahmedabad

Subject: Confirmation of Employment

Dear Darshit,

With reference to the review of your performance during the internship period from **January 06, 2022 to June 30 2022**, we are pleased to inform you that your employment is being confirmed as **Jr. Software Developer** and your yearly CTC will be revised to **Rs. 500,000/** effective from **July 01, 2022**.

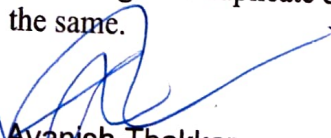
The other terms and conditions as per mentioned in your appointment letter Ref. dt. 8th September will remain unchanged.

Based on your performance, potential and organization's business needs, we expect your contribution in below mentioned points, that will form the basis of your future appraisals. The project specific Objective Key Results (OKI) shall be informed to you at the beginning of each project, Such OKI shall form the basis of your appraisal. Based each project appraisal, further skill sets and training can be added to your profile"

1. Development of PLC code
2. Maintenance of Redmine and GIT server.
3. Understanding of hardware components and their integration.
4. Improvements in existing PLC code / panel components.

We look forward to your valuable contributions and wish you all the very best for a fruitful career with our company.

Please sign the duplicate copy of this letter as a token of acceptance of the same.


Avanish Thakkar
Head (Human Resources)

Ishitva Robotic Systems

Received
Darshit
DARSHIT AMBASANA

Hardware Control and Monitoring System

A Project Report Submitted by

DARSHIT AMBASANA– 91800133009

**In partial fulfillment for the award of the degree of
Bachelor of Technology**

**In
Information and Communication Technology**



**Faculty of Technology
Marwadi University, Rajkot
2021-22**



Marwadi
University

Faculty of Technology

Marwadi University

Information and Communication Technology

2021-22

CERTIFICATE

This is to certify that the project entitled **Hardware Control and Monitoring System** has been carried out by **Darshit Ambasana - 91800133009** under my guidance in partial fulfillment of the degree of Bachelor of Technology in Information and Communication Technology of Marwadi University, Rajkot during the academic year 2021- 22.

Date: 25/04/2022

Internal Guide


Prof. Rakesh Oza

Head of the Department


Prof. C D Parmar

Seal of Institute

ii

Marwadi University, Rajkot

Date: 22nd April 2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Darshit Ambasana** of **Faculty of Technology, Marwadi University** has worked on an Industry Defined Project of **Ishitva Robotic Systems**. The work embodied in this project entitled, “**Hardware Control and Monitoring System**” has been carried out in fulfillment for the degree of Bachelor of Technology. He has undergone the project for the required period.

During this period we found him sincere, honest and diligent. We wish all success in his future endeavors.

For Ishitva Robotic Systems

Jaguti

Project Supervisor/Guide

(Jaguti Vaswani)



Ishitva Robotic Systems Private Limited

CIN: U72900GJ2018PTC103821

208, Kalasagar, Ghatlodiya, Ahmedabad, Gujarat 380061

COMPLIANCE CERTIFICATE

This is to certify that project work embodied in this dissertation titled **Hardware Control and Monitoring System** was carried out by **Darshit Ambasana – 91800133009** at **Marwadi University** for partial fulfillment of the degree of Bachelor of Technology in Information and Communication Technology to be awarded by Marwadi University. He has complied to the comments given during Review 1, Review 2 and Review 3 by Reviewer to my satisfaction.

Date: 25/04/2022

Place: Marwadi University, Rajkot

Student Signature:



Darshit Ambasana (91800133009)

Guide Signature:



Prof. Rakesh Oza

PROJECT APPROVAL CERTIFICATE

This is to certify that project work embodied in this dissertation titled **Hardware Control and Monitoring System** was carried out by **Darshit Ambasana - 91800133009** at **Marwadi University** is approved for Bachelor of Technology in Information and Communication Technology by Marwadi University.

Date: 25/04/2022

Place: Marwadi University, Rajkot

Examiner's Sign and Name: 
Prof. Rakesh Oza

Acknowledgments

I take this opportunity to express my deepest gratitude and appreciation to all those people who made this project work easier with words of encouragement, motivation and helped me towards the successful completion of this project work.

First I would like to express my sincere gratitude to our My project guide Prof.Rakesh Oza for giving continuous support, Prof.Chandrasinh Parmar, Head Of The Department of Information and Communication Technology, At Marwadi University for his insightful advice, motivating suggestions, invaluable guidance, help and lots of moral support in the successful completion of this Project and also for his constant encouragement and advice throughout my B.Tech. (Information And Communication Technology) program.

I would like to thank all other teaching staff for their valuable teaching and constant advice which made me finish this program successfully.

Finally, my deepest gratitude goes to my parents who have given me much-needed comfort, support, encouragement, and inspiration for completing this project.

Date: 25 /4 /2022

Darshit Ambasana (91800133009)

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Institute's Vision and Mission

Institute's Vision

Our vision is to address challenges facing our society and planet through sterile education that builds capacity of our students and empower them through their innovative thinking practice and character building that will ultimately manifest to boost creativity and responsibility utilizing the limited natural resources to meet the challenges of the 21st century.

Institute's Mission

- To Produce creative, responsible and informed professionals

- To produce individuals who are digital-age literates, inventive thinkers, effective communicators and highly productive.

- To deliver cost-effective quality education

- To offer world-class, cross-disciplinary education in strategic sectors of economy though well devised and synchronized delivery structure and system, designed to tackle the creative intelligence and enhance the productivity of individuals.

- To provide a conducive environment that enables and promotes individuals to creatively interact, coordinate, disseminate and examine change, opinion as well as concept that will enable students to experience higher level of learning acquired through ceaseless effort that lead to the development of character, confidence, values and technical skills.

Department's Vision and Mission

Department's Vision

To impart quality technical education through research, innovation and teamwork for creating professionally superior and ethically strong manpower that meet the global challenges of engineering industries and research organization in the area of Computer Engineering.

Department's Mission

- Maintain a vital, state-of-the art ICT enabled teaching and learning methodologies, which provides its students and faculty with opportunities to create, interpret, apply and disseminate knowledge.
- Enable graduates in becoming digital age literates, innovators, efficient communicators and result oriented professionals.
- Dedicate itself to providing its students with the skills, knowledge and attitudes that will allow its graduates to succeed as engineers, leaders, professionals and entrepreneurs.
- Prepare its graduates for life-long learning to meet intellectual, ethical and career challenges.
- Inspire graduates for competitive exam higher education as well as research and development.

PEO, PO and PSO

Program Educational Objectives (PEO):

Our graduated students are expected to fulfill the following Program Educational Objectives (PEOs):

1. **Core Competency:** Successfully apply fundamental mathematical, scientific, and engineering principles in formulating and solving engineering and real life problems for betterment of society.
2. **Breadth:** Will apply current industry accepted practices, new and emerging technologies to analyze, design, implement and maintain state of art solutions.
3. **Professionalism:** Work effectively and ethically in ever changing global professional environment and multi-disciplinary environment.
4. **Learning Environment:** Demonstrate excellent communication and soft skills to fulfil their commitment towards social responsibilities and foster life-long learning.
5. **Preparation:** Promote research and patenting to enhance technical and entrepreneurship skills within them
 - Function and communicate effectively to solve technical problems.
 - Advance professionally to roles of greater computer engineering responsibilities, and/or by transitioning into leadership position in various industries such as business, government, and/or education.
 - Prepare for entrepreneurship skills by demonstrating commitment to community by applying technical skills and knowledge to support various service activities.
 - Place themselves in positions of leadership and responsibility within an organization and progress through advanced degree or certificate programs in engineering, business, and other professionally related fields.
 - Participate in higher study by the process of life-long learning through the successful completion of advanced degrees, continuing education, and/or engineering certification(s)/licensure or other professional development.

Program Outcomes (POs)

Engineering Graduates will be able to:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

PSO1. Students shall demonstrate skills, the knowledge and competence in the analysis, design and development of computer based systems addressing industrial and social issues.

PSO2. Students shall have competence to take challenges associated with future technological issues associated with security, wearable devices, augmented reality, Internet of Anything etc.

Abstract

In the rising age of IOT(Internet of Things), a branch of it known as IIOT i.e., Industrial IOT is developing stage. Such systems have integration of complex computer programming software, computer network, and new as well as old industrial automation components.

Data is generated with use of sensors, which is used to predict future operations and deciding action path. Multiple node machinery connected to central system to make complete connected plant. Machines can be operated locally through Human Machine Interface and also through remote dashboard made upon web development technologies.

A actuators controller and sensor monitoring software based on C++, QT and Ladder programming . Rather than using third party SCADA software the proposed solution includes a current status dashboard along with a report module where administrators can monitor system behavior and a control module through which the control of actuators and other hardware components is possible. It automatically manages the hardware components in error state in order to prevent system crashes. For instance, it includes reading rotary encoder(sensor) data in PLC and sending it to monitoring software on PC via Modbus TCP communication protocol.

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1. Introduction

○ Introduction

A actuators controller and sensor monitoring software based on C++, QT and Ladder Programming. Rather than using third party SCADA software the proposed solution includes a current status dashboard along with a report module where administrators can monitor system behavior and a control module through which the control of actuators and other hardware components is possible. It automatically manages the hardware components in error state in order to prevent system crashes. For instance, it includes reading rotary encoder(sensor) data in PLC and sending it to monitoring software on PC via Modbus TCP communication protocol.

○ Definition

A live control and monitoring system can be deployed by industries which require machine automation. Controlling a machine through the single software screen also known as human machine interface, and generating statistical data based on daily operation using sensors.

○ Scope

This project aims to provide facility machine operation as simple as using a mobile phone. Any machine operator must be ready and happy to work with the machine with minimal training period. Hence making the user interface simple yet not missing any hardware interlocks and also log important events and data of the machine.

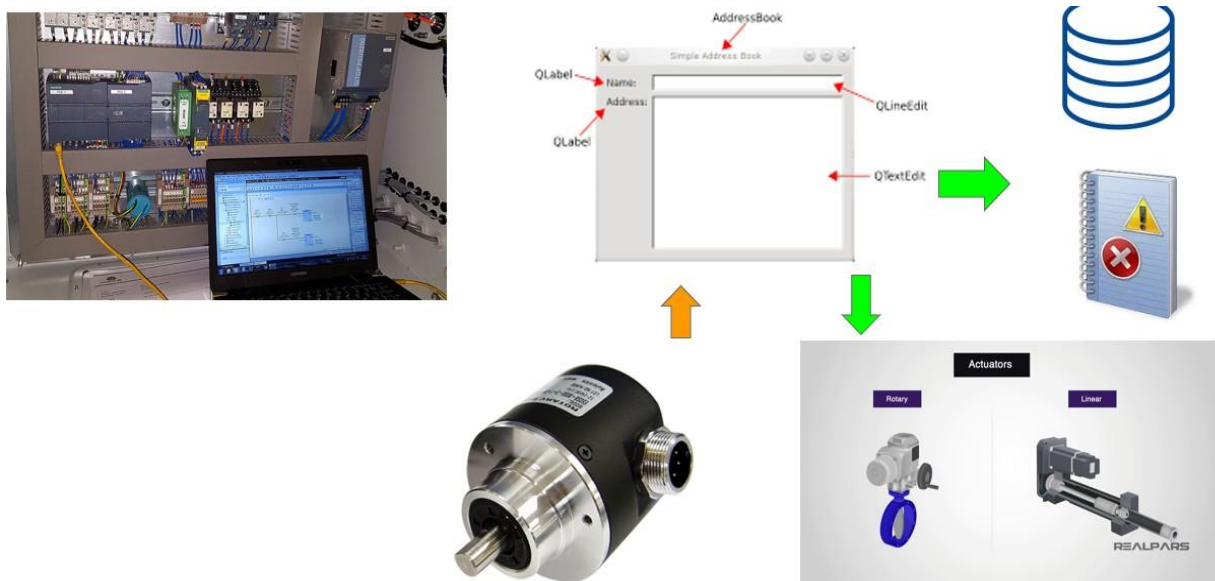


Fig 1.1 System Flow

○ Objectives

On the given system there will be a PLC i.e. Programmable logic controller used to signal the motor to move a payload, a rotary encoder giving real time motor movement feedback. And, mainly the software which acts as a human machine interface to set parameters, control and monitor motor based on data it gets from PLC through communication. Also generate reports and logs in software for higher order analysis.

○ Problem Specification

There are many other systems are also available in market but as per our research we find most of the existing system have to face this type of issues:

- Confined developer environment
- Limited user and developer control over hardware
- Integration of low level computer programming is not possible

To overcome the above-mentioned problems, have implemented a “Hardware Control and Monitoring System” that can give you user-friendly and access.

2. Project Management

○ Project Planning

The software project management process begins with the set of activities that are collectively called project planning. The objective of software project planning is to provide a framework that enables the administrator to make reasonable estimates of resources, cost, and schedule.

Task	From Date	To Date
Functionality	08/1/2022	10/1/2022
Functionality Description	11/1/2022	13/1/2022
Learning Hardware	14/1/2022	10/2/2022
Learning Software	12/2/2022	06/3/2022
Defining Diagrams	08/3/2022	11/3/2022
Wireframes and Database Schema	12/3/2022	14/3/2022
Implementation	15/3/2022	02/4/2022
Final Report	14/4/2022	19/4/2022

Table 2.1 Project Planning

○ Project Scheduling

The following table outlines the tasks that need to be completed for each phase and the students who are responsible for those tasks.

Task List	Members
Planning	Darshit Ambasana
Implementation	Darshit Ambasana
Design Functionality on paper	Darshit Ambasana
Plan Hardware component list	Darshit Ambasana
Desing circuit/wiring diagram	Darshit Ambasana
PLC programming	Darshit Ambasana
Implement and verify PLC side programme	Darshit Ambasana
Desing software wireframe	Darshit Ambasana
Desing database schema	Darshit Ambasana
Hardware documentation	Darshit Ambasana
Software documentation	Darshit Ambasana
UI programming	Darshit Ambasana
Back-end programming	Darshit Ambasana
Implement and verify system	Darshit Ambasana

Table 2.2 Scheduling

3. System Requirements Study

○ User Characteristic

User has access to use bellowed mentioned functionality:

- Main Window/Dashboard:
 - Monitor live motor data. Navigate to other parts of software.
- Communication Wizard:
 - Set Modbus TCP parameters for PLC and software communication.
- Reports:
 - View timely graphs based on sensor data stored session wise in the database.
- Logs:
 - View session logs. Useful for system debug.
- Motor Wizard:
 - Set motor parameters from software, which then is set in VFD through PLC.

○ Hardware and Software Requirement Specification

This shows minimum requirements to carry on to run this system efficiently.

3.2.1 Hardware

- Siemens S7-1200 PLC
- Autonics rotary encoder
- LAN Cable
- Computer (Ubuntu OS for software coding, Windows OS for TIA Portal PLC coding)
- 24VDC Power supply
- Yaskawa V1000 VFD
- Induction Motor

3.2.2 Software

- TIA Portal
- C++ QT development tools and dependencies
- SQLite

4. System Analysis

○ Features of New System

The project “Hardware Control and Monitoring System” includes features mentioned below:

- Setup PLC to Software communication.
- Control of motor via human machine interface.
- Dynamic hardware parameters.
- Generate data and store logs.
- Data visualization in the form of graphs.
- Easy user interface and debugging.

Pages:

1. Main Window/ Dashboard

- Quick access controls and data display to control the motor from software.

2. Communication Wizard

- Set and test communication between software and PLC hardware.

3. Reports

- Display timely data visualization in the form of Bar charts.

4. Logs

- Display session logs in tabular format. All logs can be seen by the developer in a text file generated in the background.

5. Motor Wizard

- Edit motor parameters that have to be set in variable frequency drive for motor commissioning.

○ **Diagrams**

4.2.1 Class Diagram

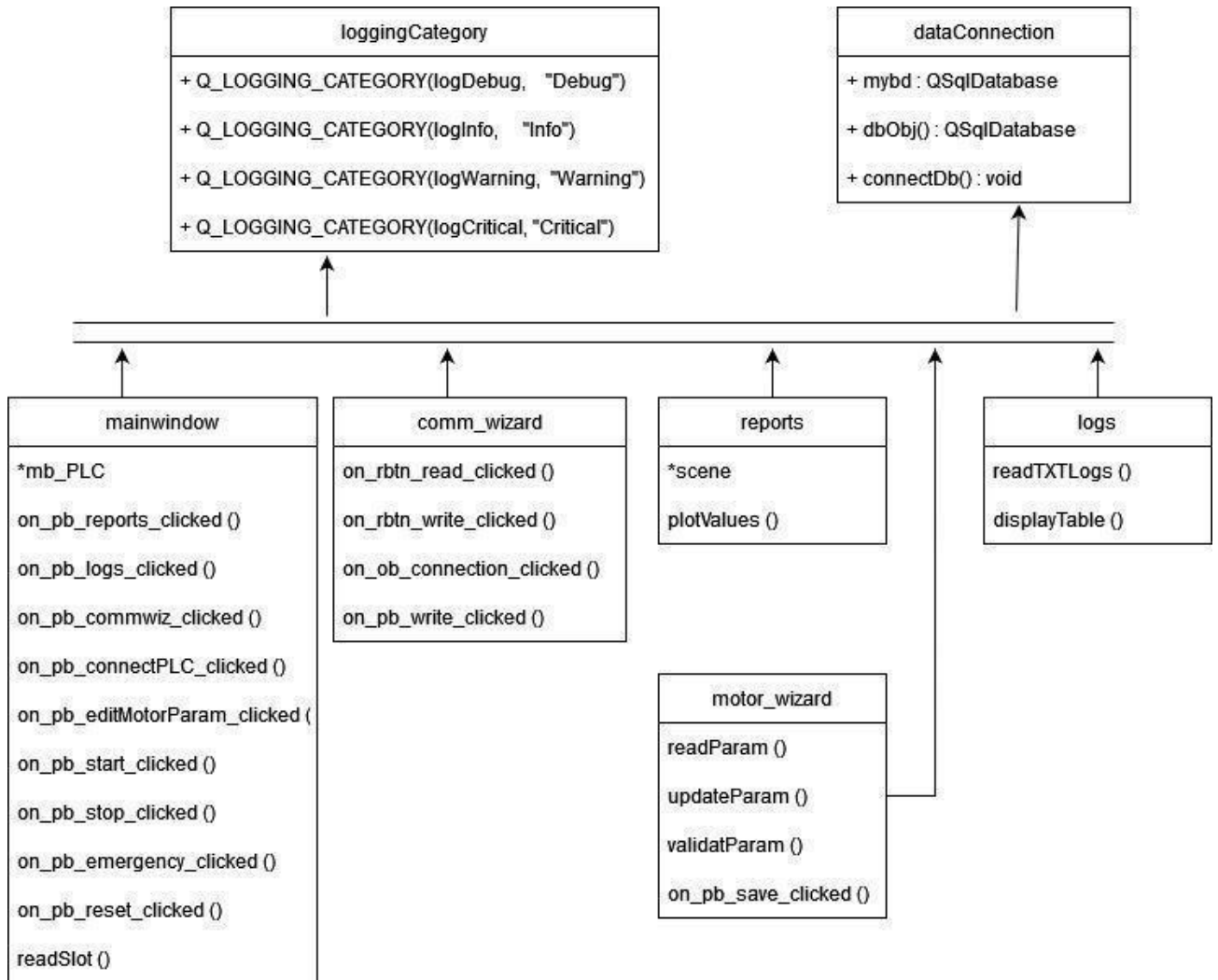


Fig 4.2.1 Class Diagram

4.2.2 Flow Chart

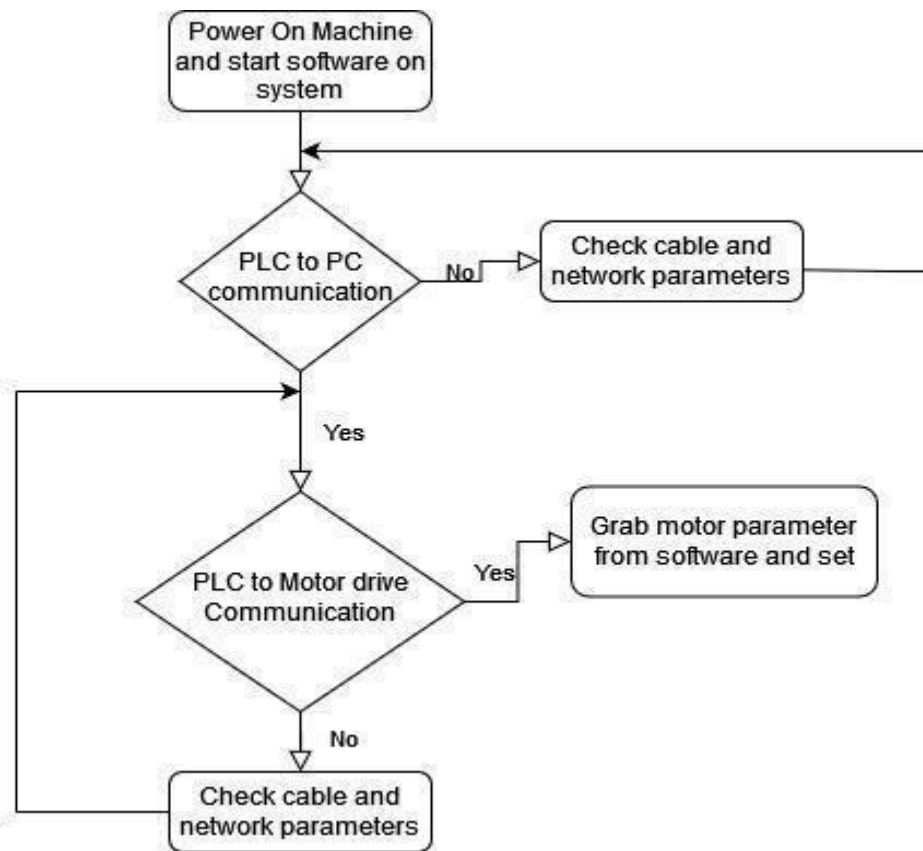


Fig 4.2.2 Flow Chart

5. System Design & Implementation

5.1 Block Diagram

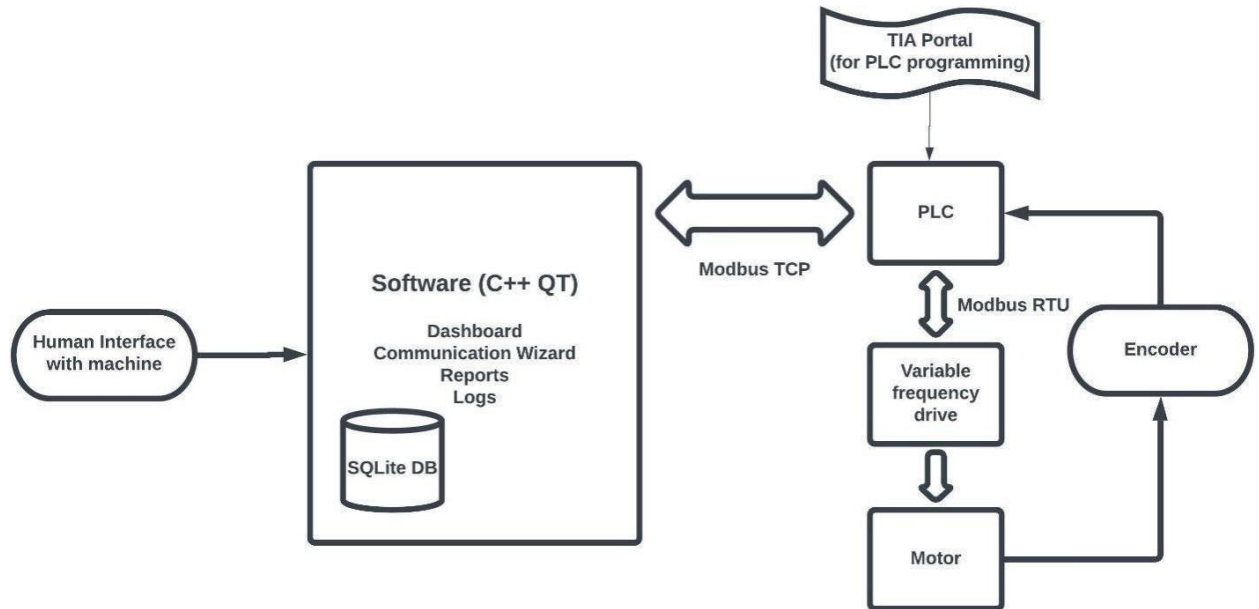


Fig 5.1.1 Block Diagram

5.2 Hardware Design

Wiring Diagram

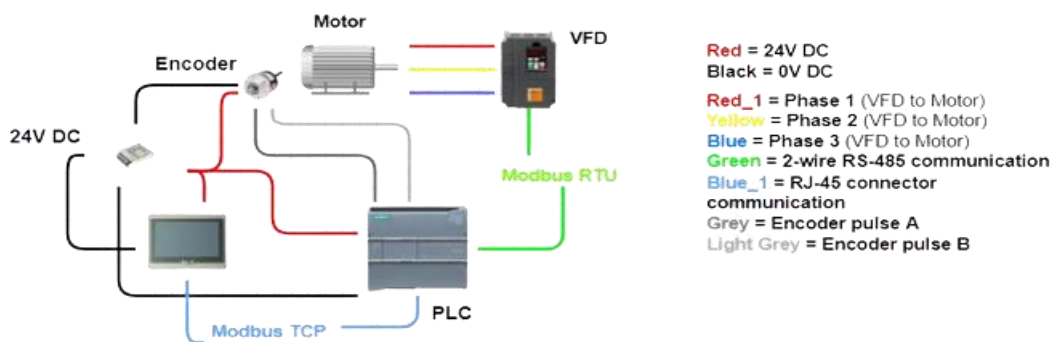


Fig 5.2.1 Wiring Diagram

PLC Programming

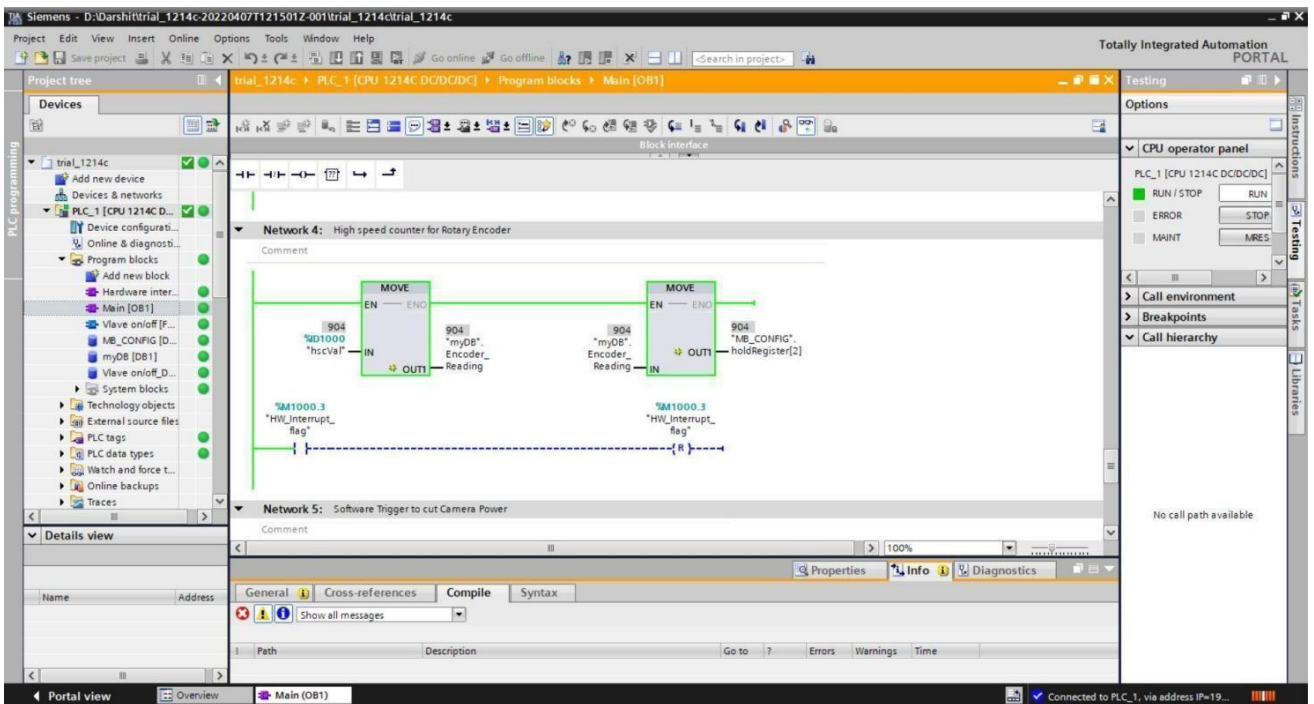


Fig 5.2.2 Tia Portal Overview

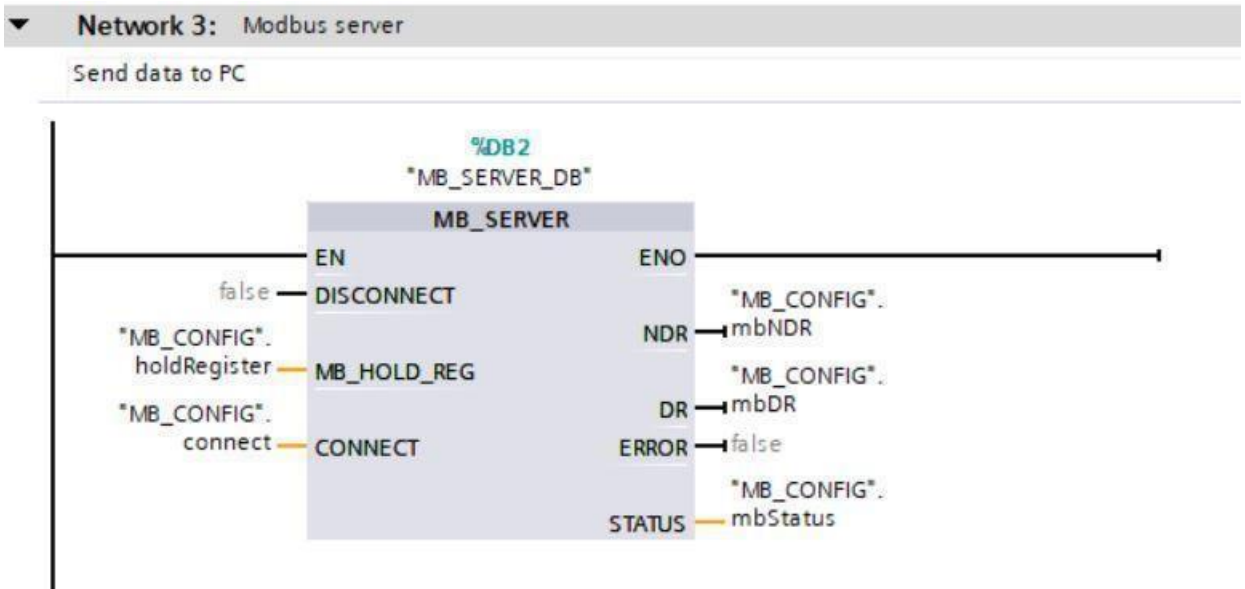


Fig 5.2.3 Modbus Server Program Block

5.3 Software Design

Database Table Design

1. motorParameters:

Parameter	Drive Address	Value
Filter	Filter	Filter
1 Control ...	A1-02	0
2 freq. ref. ...	b1-01	0 = operato...
3 run comma...	b1-02	0 = operato...
4 Stop method	b1-03	0
5 Acceleratio...	c1-01	15 seconds
6 Decelerati...	c1-02	NULL
7 use in heav...	c6-01	0
8 forward star...	h1-01	40
9 fault reset a...	h1-04	14
10 multi speed...	h1-05	3
11 fault raise ...	h2-01	E
12 drive ready ...	h2-02	6
13 freq. ref. ...	h3-01	0
14 monitor val...	h4-01	103
15 Input voltag...	E1-01	415
16 V/f Pattern ...	E1-03	F
17 Max. Outpu...	E1-04	50
18 Max. Outpu...	E1-05	415
19 Base freq.	E1-06	50
20 Motor rated...	E2-01	10

Fig 5.3.1(a) Database Tables

2. motorLogs:

Name	Type
Tables (1)	
motorLogs	
date	TEXT
time	TEXT
frequency	REAL
current_output	REAL
rpm	REAL
encoder_pulse	NUMERIC
Indices (0)	
Views (0)	
Triggers (0)	

Fig 5.3.1(b) Database Tables

Page Layouts

1. Main Window/Dashboard:



Fig 5.3.2 Dashboard

2. Report



Fig 5.3.3(a) Reports Window

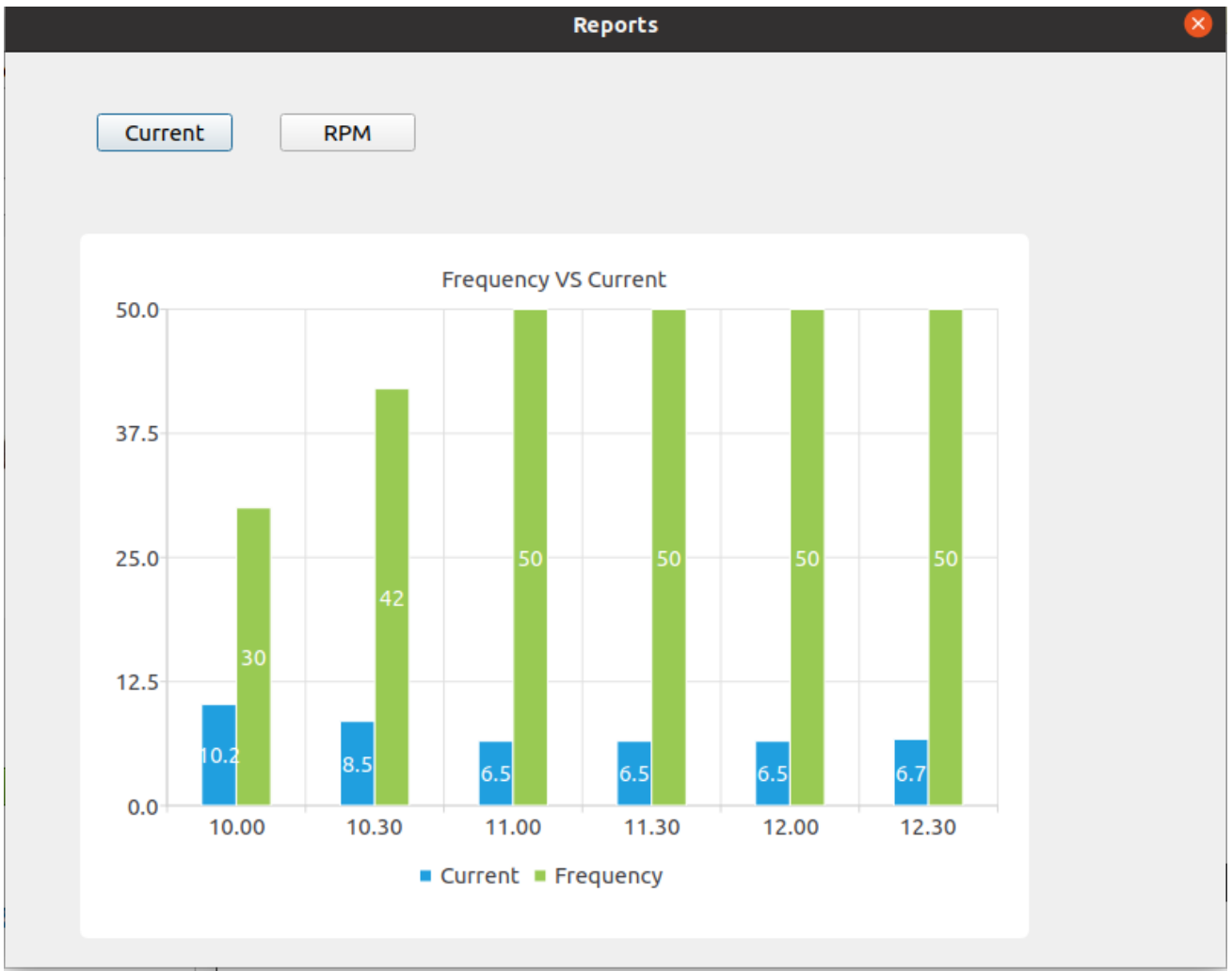


Fig 5.3.3(b) Reports Window

3. Logs (generated text logs + window):

```

1 2022-04-14 , 10:05:17.048 , default , DB Connected
2 2022-04-14 , 10:05:17.048 , Info , System Start
3 2022-04-14 , 10:05:17.048 , Debug , Read Thread Start
4 2022-04-14 , 10:05:30.589 , default , Connection closed succesfully.
5 2022-04-14 , 10:05:30.589 , Info , PLC Disconnect
6 2022-04-14 , 10:05:30.589 , Info , System Stop
7 2022-04-14 , 10:24:48.528 , default , DB Connected
8 2022-04-14 , 10:24:48.529 , Info , System Start
9 2022-04-14 , 10:24:48.530 , Debug , Read Thread Start
10 2022-04-14 , 10:25:21.139 , default , Connection closed succesfully.
11 2022-04-14 , 10:25:21.139 , Info , PLC Disconnect
12 2022-04-14 , 10:25:21.139 , Info , System Stop
13 2022-04-14 , 10:45:12.105 , default , DB Connected
14 2022-04-14 , 10:45:12.105 , Info , System Start
15 2022-04-14 , 10:45:12.106 , Debug , Read Thread Start
16 2022-04-14 , 10:45:30.757 , default , Connection closed succesfully.
17 2022-04-14 , 10:45:30.757 , Info , PLC Disconnect
18 2022-04-14 , 10:45:30.757 , Info , System Stop
19 2022-04-18 , 12:39:39.123 , default , DB Connected
20 2022-04-18 , 12:39:39.123 , Info , System Start
21 2022-04-18 , 12:39:39.123 , Debug , Read Thread Start
22 2022-04-18 , 12:39:47.506 , default , Connection closed succesfully.
23 2022-04-18 , 12:39:47.506 , Info , PLC Disconnect
24 2022-04-18 , 12:39:47.506 , Info , System Stop
25 2022-04-18 , 12:41:10.406 , default , DB Connected
26 2022-04-18 , 12:41:10.406 , Info , System Start
27 2022-04-18 , 12:41:10.414 , Debug , Read Thread Start
28 2022-04-18 , 12:41:23.784 , default , Connection closed succesfully.
29 2022-04-18 , 12:41:23.784 , Info , PLC Disconnect
30 2022-04-18 , 12:41:23.784 , Info , System Stop
31 2022-04-18 , 22:53:00.785 , default , DB Connected
32 2022-04-18 , 22:53:00.786 , Info , System Start
33 2022-04-18 , 22:53:00.791 , Debug , Read Thread Start
34 2022-04-18 , 22:53:21.670 , default , Connection closed succesfully.
35 2022-04-18 , 22:53:21.670 , Info , PLC Disconnect
36 2022-04-18 , 22:53:21.670 , Info , System Stop
37 2022-04-18 , 22:56:37.584 , default , DB Connected
38 2022-04-18 , 22:56:37.584 , Info , System Start
39 2022-04-18 , 22:56:37.585 , Debug , Read Thread Start
40 2022-04-18 , 22:56:43.059 , default , Connection closed succesfully.
41 2022-04-18 , 22:56:43.059 , Info , PLC Disconnect
42 2022-04-18 , 22:56:43.059 , Info , System Stop
43 2022-04-18 , 22:57:53.776 , default , DB Connected
44 2022-04-18 , 22:57:53.778 , Info , System Start
45 2022-04-18 , 22:57:53.786 , Debug , Read Thread Start
46 2022-04-18 , 22:57:56.321 , default , Connection closed succesfully.
47 2022-04-18 , 22:57:56.321 , Info , PLC Disconnect
48 2022-04-18 , 22:57:56.321 , Info , System Stop

```

Fig 5.3.4(a) Log text file data

```

34 2022-04-18 , 22:53:21.670 , default , Connection closed succesfully.
35 2022-04-18 , 22:53:21.670 , Info , PLC Disconnect
36 2022-04-18 , 22:53:21.670 , Info , System Stop
37 2022-04-18 , 22:56:37.584 , default , DB Connected
38 2022-04-18 , 22:56:37.584 , Info , System Start
39 2022-04-18 , 22:56:37.585 , Debug , Read Thread Start
40 2022-04-18 , 22:56:43.059 , default , Connection closed succesfully.
41 2022-04-18 , 22:56:43.059 , Info , PLC Disconnect
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43 2022-04-18 , 22:57:53.776 , default , DB Connected
44 2022-04-18 , 22:57:53.778 , Info , System Start
45 2022-04-18 , 22:57:53.786 , Debug , Read Thread Start
46 2022-04-18 , 22:57:56.321 , default , Connection closed succesfully.
47 2022-04-18 , 22:57:56.321 , Info , PLC Disconnect
48 2022-04-18 , 22:57:56.321 , Info , System Stop
49 2022-04-18 , 22:58:38.817 , default , DB Connected
50 2022-04-18 , 22:58:38.817 , Info , System Start
51 2022-04-18 , 22:58:38.826 , Debug , Read Thread Start
52 2022-04-18 , 23:01:01.957 , Info , Motor Start
53 2022-04-18 , 23:01:03.183 , Info , Motor Stop
54 2022-04-18 , 23:01:04.564 , Critical , Software emergency trigger!!
55 2022-04-18 , 23:01:05.575 , Info , Drive Fault Reset
56 2022-04-18 , 23:01:08.709 , default , Modbus Client is created 502.
57 2022-04-18 , 23:01:08.709 , default , Modbus Client is created 503.
58 2022-04-18 , 23:01:08.710 , default , Modbus Client is Connected::502
59 2022-04-18 , 23:01:08.710 , default , Modbus Client is Connected::503
60 2022-04-18 , 23:01:08.887 , default , Modbus Client is not Connected in read section
61 2022-04-18 , 23:01:08.887 , qt.modbus , (Client) Device is not connected
62 2022-04-18 , 23:01:08.887 , default , "Device not connected."
63 2022-04-18 , 23:01:09.087 , default , Modbus Client is not Connected in read section
64 2022-04-18 , 23:01:09.087 , qt.modbus , (Client) Device is not connected
65 2022-04-18 , 23:01:09.087 , default , "Device not connected."
66 2022-04-18 , 23:01:09.287 , default , Modbus Client is not Connected in read section
67 2022-04-18 , 23:01:09.287 , qt.modbus , (Client) Device is not connected
68 2022-04-18 , 23:01:09.287 , default , "Device not connected."
69 2022-04-18 , 23:01:09.487 , default , Modbus Client is not Connected in read section
70 2022-04-18 , 23:01:09.487 , qt.modbus , (Client) Device is not connected
71 2022-04-18 , 23:01:09.487 , default , "Device not connected."
72 2022-04-18 , 23:01:09.687 , default , Modbus Client is not Connected in read section
73 2022-04-18 , 23:01:09.687 , qt.modbus , (Client) Device is not connected
74 2022-04-18 , 23:01:09.687 , default , "Device not connected."
75 2022-04-18 , 23:01:09.887 , default , Modbus Client is not Connected in read section
76 2022-04-18 , 23:01:09.887 , qt.modbus , (Client) Device is not connected
77 2022-04-18 , 23:01:09.887 , default , "Device not connected."
78 2022-04-18 , 23:01:10.006 , Info , PLC Disconnect through Button
79 2022-04-18 , 23:01:11.399 , default , Connection closed succesfully.
80 2022-04-18 , 23:01:11.399 , Info , PLC Disconnect
81 2022-04-18 , 23:01:11.399 , Info , System Stop

```

Fig 5.3.4(b) Log text file data

Date	Time	Severity	Message	Error Solving Suggestions
				- Point 1
				- Point 2
				.
				.

Fig 5.3.5 Logs Window

4. Communication Wizard:

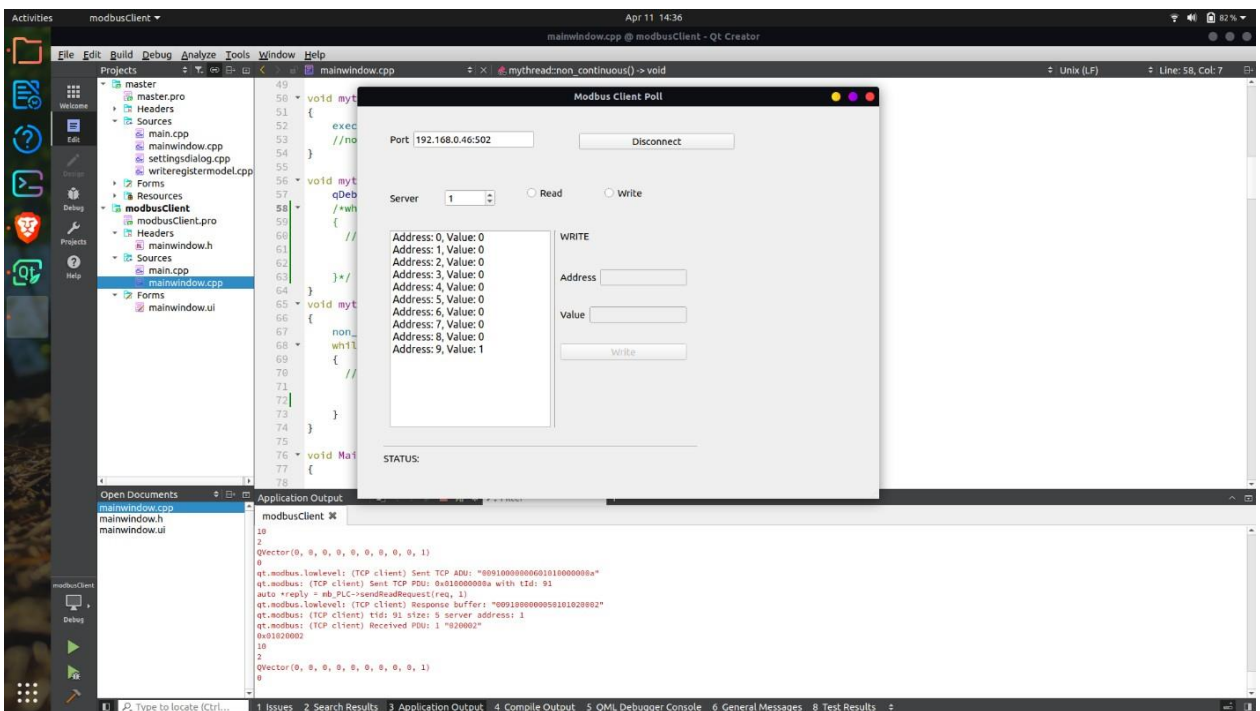
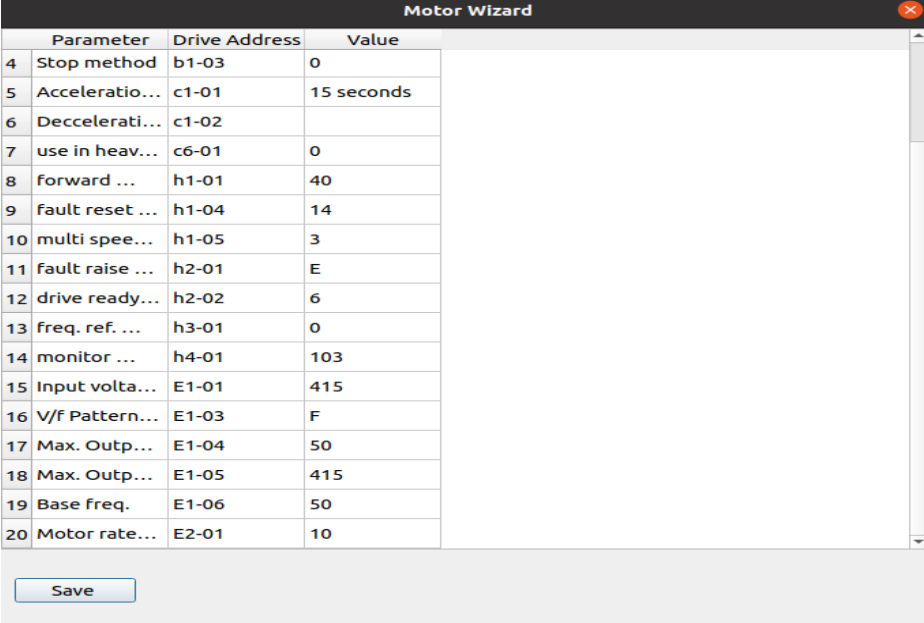


Fig 5.3.6 Communication Wizard

5. Motor Wizard:



The screenshot shows a window titled "Motor Wizard" with a close button in the top right corner. The window contains a table with three columns: "Parameter", "Drive Address", and "Value". The table lists 20 parameters with their corresponding drive addresses and values. A "Save" button is located at the bottom left of the window.

	Parameter	Drive Address	Value
4	Stop method	b1-03	0
5	Acceleratio...	c1-01	15 seconds
6	Deccelerati...	c1-02	
7	use in heav...	c6-01	0
8	forward ...	h1-01	40
9	fault reset ...	h1-04	14
10	multi spee...	h1-05	3
11	fault raise ...	h2-01	E
12	drive ready...	h2-02	6
13	freq. ref. ...	h3-01	0
14	monitor ...	h4-01	103
15	Input volta...	E1-01	415
16	V/f Pattern...	E1-03	F
17	Max. Outp...	E1-04	50
18	Max. Outp...	E1-05	415
19	Base freq.	E1-06	50
20	Motor rate...	E2-01	10

Save

Fig 5.3.7 Motor Wizard

6. Conclusion

6.1 Conclusion:

The project is only a humble venture for the firms that are working on specific hardware automation where the system requires industrial controllers along with computer programming-based systems.

6.2 References:

[1] QT C++. Doc.qt.io. 2022. *Qt 5.12*. [online]

Available at: <https://doc.qt.io/archives/qt-5.12/index.html>

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Available at:

<https://www.yaskawa.com/delegate/getAttachment?documentId=SIIPC71060618&cmd=documents&documentName=SIIPC71060618.pdf>

M.Sc Chemistry
Faculty of Science
Marwadi University

**1.3.4 Approval from concerned HOD along with Project
Report/Completion certificate**

**ANALYSIS OF PHARMACUTICAL INGREDIENTS BY KARL- FISHER, UV-VISIBAL
SPECTROSCOPY AND INFRA-RED SPECTROSCOPY.**

By

Parth M. Arambhadiya

(92000216007)

Guide by

Dr. Sabera Bijani

Assistant professor in
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Project
A Thesis to submitted to

Marwadi university in partial fulfilment of the requirement for the in M.SC analytical chemistry.

MAY-2022



**Marwadi
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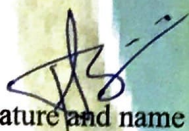
Head,
Department of Chemistry,
Marwadi University, Rajkot

CERTIFICATE

This is to certify that research/project work embodied in this dissertation titled **ANALYSIS OF PHARMACUTICAL INGREDIENTS BY KARL- FISHER, UV-VISIBAL SPECTROSCOPY AND INFRA-RED SPECTROSCOPY**. Was carried out by **PARTH M. ARAMBHADIYA** at **MARWADI UNIVERSITY** for partial fulfilment of **MASTER OF SCIENCE in ANALYTICAL CHEMISTRY** to be awarded by **MARWADI University**. This research work has been carried out under my guidance and supervision and it is up to my satisfaction.

Date: 12/05/2022.

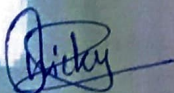
Place: Rajkot.



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Guid

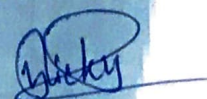
Dr. Sabera Bijani



Signature and name of

HOD

Dr. Vicky Jain



Signature and name of

Principal

Dr. Vicky Jain

Head,
Department of Chemistry,
Marwadi University, Rajkot



COMPLIANCE CERTIFICATE

This is to certify that research/project work embodied in this dissertation titled **ANALYSIS OF PHARMACUTICAL INGREDIENTS BY KARL- FISHER,UV-VISIBAL SPECTROSCOPY AND INFRA-RED SPECTROSCOPY**. Was carried out by **PARTH ARAMBHADIYA (92000216007)** at **MARWADI** university for partial fulfilment **MASTER OF SCIENCE** to be awarded by a **MARWADI** university. He/she has complied to the comments given during review I, review II & review III..... By reviewer to my satisfaction.

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Place: Rajkot

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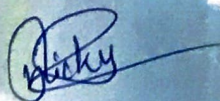
THESIS/PROJECT APPROVAL CERTIFICATE

This to certify that research/project work embodied in this dissertation titled **ANALYSIS OF PHARMACUTICAL INGRIDIENTS BY KARL- FISHER,UV-VISIBAL SPECTROSCOPY AND INFRA-RED SPECTROSCOPY.** was carried out by **PARTH M. ARAMBHADIYA (9200021600)** at **MARWADI UNIVERSITY** for partial fulfilment **MASTER OF SCIENCE** with specialization in analytical chemistry by Marwadi University.

Date: 12/05/2022

Place: Rajkot

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I hereby certify that we are the sole authors of this thesis/project work and that neither any part of this thesis nor the whole of the thesis has been submitted for a degree to any other university or institution.

I certify that, to best of our knowledge, the current project work does not infringe upon anyone's copyright nor violate any proprietary right and that any ideas, techniques, quotations or any other material from the work of other people included in our project work, published or otherwise, are fully acknowledged in accordance with the standard referencing practices. Furthermore, to the extent that we have included copyrighted material that surpasses the boundary of fair dealing within the meaning of the Indian copyright act 2012, we certify that we have obtained a written permission from the copyright owner(s) to include such material(s) in the current thesis and have included copied of such copyright clearances to our appendix.

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ACKNOWLEDGEMENT

I would like to express the deepest appreciation to my co-ordinator, professor DR. MANISH THAPA, who has the attitude and the substance of a genius. Without his guidance and persistent help this project work would not have been possible.

I would also like to thank our HOD and principal sir DR. VICKY JAIN. I would like to thank my faculty member, professor DR. SABERA BIJANI.

I am adding a thank you to DR. KESHAV DEO management director of ALMELO PVT. LIMITED. Who had permitted me to a training in their ADL department I also thank to ADL staff members to provide me a very comfortable zone. At last, I would like to thank my whole chemistry faculty for support me, teach me, for my better future.

I would warmly thank to MARWADI UNIVERSITY for allowing me to do my dissertation work outside company, their kind co-operation and encouragement which help us in completion of this project.

Thank you so much everyone.

Parth Arambhadiya



Dr. Manish Thapa.

HOD of ADL department

Almelo Pvt. limited.

Whom so ever concerned

This is to certified that, the project work entitled: ANALYSIS OF PHARMACUTICAL INGRIDIENTS BY KARL-FISHER, UV-VISIBAL SPECTROSCOPY AND INFRA-RED SPECTROSCOPY has been undertaken by **Mr. Parth Arambhadiya** and carried out the project work under my supervision at ALMELO PVT. LIMITED, IDPL, KUKATPALLY, HYDERABAD – TELANGANA, INDIA. During period Feb-April 2022.

During the project period, I observed **Mr. Parth Arambhadiya**, is a sincere and obedient and hard work student. I wish him a best of success in future career.


29/04/2022
(Dr. Manish Thapa)

Date: 29/04/2022

Place: Hyderabad.



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LIST OF ABBREVIATIONS

- ^{13}C NMR = 13 carbon nuclear magnetic resonance.
- IR = Infra Red
- UV = Ultra Violet spectroscopy
- KBr = potassium bromide
- NaCl = sodium chloride
- mg = milli gram
- gm = gram
- KF = Karl Fischer
- DST = disodium tartrate
- nm = nano meter
- cm^{-1} = centimetre inverse
- M/C = moisture content
- MeOH = methanol

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ABSTRACT

In this project studied about Karl Fischer titration, IR spectroscopy, UV-Visible spectroscopy and pharmaceutical ingredients, analyse by Karl Fischer titration, IR spectroscopy, and UV-Visible spectroscopy, and a Get IR spectrum, and UV spectrum of pharmaceutical ingredients.

1. INTRODUCTION OF ANALYTICAL CHEMISTRY

Analytical chemistry is the branch of the chemistry in which cope with the employment of instrument and which are applicable to isolate, recognize and quantify matter. Classical methods and instrumental method is the main two part of the analytical chemistry. Classical methods including quantitative analysis and qualitative analysis in manual way.

Qualitative analysis includes identification of any compound in the substance. Methods such as a distillation, extraction, precipitation, odour, reactivity and may more. Quantitative analysis, makes use of mass and volume to measure the amount of substance, Gravimetric and volumetric analysis is a part of this method.

Instrumental method is the most advance methods in analytical chemistry. With the help of instrumental method quantitative and qualitative analysis can be possible at a same time.

In instrumental method advance chromatographic method, spectroscopic method, electrophoresis, conductometry method, flame photometry method, and many more advance hyphenated techniques....

2. APPLICATION AND SCOP OF ANALYTICAL CHEMISTRY

In pharmaceutical industries, analytical chemistry posses importance in giving idea about the compound's purity as well as it separation out desired compound. Analysis of drug help to determine self-life of drug. Any adulterants presents in the drug, dissolution of the drug and also help in quantifying the drugs.

In agricultural society attention is needed to be given to its quality as it is the various analysis for soil testing, water testing, harvest crop testing is one with the help of analytical instrument.

Environmental pollution is taken is control by testing sample of air, water etc...

Medical studies carried based on analytical studies. Bio analytical branch keeps an eye on analysis carried out in biological field.

^{13}C NMR spectroscopy is used in polymer analysis and cosmetic analysis.

Quality of food and beverages supplied in market are first well tested will developed analytical method.

Analytical study ensures that quality of the matter synthesised. Wide scope of analytical chemistry is seen in near future.

3. KARL FISHER TITRATION

3.1 INTRODUCTION

Karl Fischer titration is a frequently used analytical method for determining the amount of water in various materials. Karl Fischer, a German scientist created, it in 1935. A long variety of features of pharmaceutical good are affected by moisture content, and this has a direct impact on how tablets are formed. Karl Fischer devised a method for measuring water at low concentration that was both selective and specific. Moisture content is measured in present range in a Karl Fischer titration.

3.2 PRINCIPAL

The quantitative reaction of water with sulphur dioxide and iodine in a suitable media such as methanol and in the presence of base is used to determine water. The water content is evaluated by measuring the amount of iodine consumed as a result of reaction of water contained in sample..

3.3 WHY IS MOISTURE ANALYSIS IS IMPORTANT ?

The consistency and stability of tablets are affected by moisture. Agglomeration of powder particles and a poor crumbly tablet are both caused by too much moisture. The tablet will come apart if there is not enough moisture. The chemical and physical properties of active substance can be affected by moisture.

As a result it is critical to analyse moisture content during manufacturing and understand how it affected each step of the process development. It cannot be taken for granted because it ultimately affects human health.

3.4 CHEMICAL REACTION.

A solvent alcohol, iodine, a base, and sulphur dioxide make up the Karl Fischer reagent .The alcohol combines with sulphur dioxide and base to generate an acid in this process.

Intermediate alkyl sulphate salt, which is then oxidised by iodine to generate an alkyl sulphate salt. Water is consumed in this reaction. Pyridine was once the most frequent base for KF titration, however it has since been supplanted by imidazole.



3.5 STANDARDIZATION PROCESS OF KF REAGENT.

Disodium tartrate is used to standardise the KF reagent, Transfer 35 to 40 ml methanol or another acceptable solvent to the flask unless otherwise specified vessel for titration.

Neutralise the solvent with KF reagent, Weight accurately 150-250 mg of DST transfer it into the titration vessel. Titrate the content with Karl Fischer reagent to end point to the electrometric or visual endpoint.

3.6 FACTOR CALCULATION FORMULA

FACTOR= weight of DST \times 15.66 \times 1000/B.R/100

3.7 MOISTURE CONTENT CALCULATION FORMULA

%M/C=volume of KF reagent \times factor of KF reagent \times 100 /weight of sample /1000



Fig 1:Karl Fischer instrument

3.8 ADVANTAGES

Karl Fischer titration has the benefit or being applicable to both volatile and non-volatile compound as non-volatile chemicals, as well as non-volatile substances that can not be dried without loss

It provides greater precision and accuracy than other methods Karl Fischer titration is simple to execute and has a short analytical duration.(2-3 mins)

In Karl Fischer titration, the sample preparation is straightforward it is a quick procedure with a small sample size. KF titration is a reliable and stable method for determining the presence of water in a sample, because KF titration is based on a mathematical formula, it provides high accuracy and precision. Chemical reaction that is dependent on.

3.9 DISADVANTAGES.

Because manual volumetric KF titration necessitates reloading for each determination, it consumes a lot of solvent. When manual volumetric KF titration is used on materials that contain starch, the margin of error is relatively significant.

KF titration is a damaging method. KF titration based on a redox reaction, any active redox chemical in the sample, such as dimethyl sulfoxide, would react with the reagent's iodine and produce erroneous findings.

Some substance such as chocolate, have tightly bound water that is released slowly, usually after the sample has been broken down with a mixer. Lithium chloride has firmly bonded water of hydration, making it challenging to utilize with KF titration when it is part of the solvent.

Carbonates, oxides and hydroxides also undergo side reaction and are not suitable for KF titration. Drift is due to apparent water in the sample and must be calculated in a dry run and subtracted from the final result.

Ketones and aldehydes, boric acid and metal peroxides can not be analysed without modification because they react with methanol solvent and continue to produce water as a result of high end-point and freshly high water content.

3.10 EXAMPLE OF WATER CONTENT.

Sr. no	Sample ID	Weight of sample	B.R (ml)	KF Factor	M/C
01	KSR115/A-237/037(PRS)	1 ml	0.26	5.0	0.13%
02	KSR115 2-Bromophenol	1ml	0.34	5.0	0.17%
03	KSR590022AL	0.20 gm	0.47	5.53	1.27%
04	KSR70/A-243/159(PRS)	0.25 gm	1.61	5.75	3.68%
05	KSR90/A-217/057	0.25 gm	0.28	5.76	0.63%
06	EIA00122AL	1ml	0.42	5.91	0.25%
07	KSR53/A-127/049 DIKETO	0.5 gm	1.82	5.43	1.97%
08	KSR111/S-I/104(F1)	0.45gm	10.92	5.6	13.47%
09	KSR111/S-I/104(F2)	0.27gm	11.48	5.6	23.46%
10	KSR115/A-237/071 HVD	0.70gm	0.29	5.2	0.21%
11	KSR11500422 AL S-V	0.20gm	0.12	5.50	0.33%
12	KSR115/A-237/065 S-III	0.07gm	0.28	5.61	2.25%
13	KSR57A-134/040 STG.	0.50gm	3.21	5.43	3.43%
14	KSR115/2-methyl THF	2.0ml	1.09	5.8	0.32%
15	KSR115/Acetonitrile	0.75gm	0.11	5.6	0.09%
16	KSR115/MgCl ₂	0.20gm	2.99	5.0	7.41%
17	N-methyl-2-pyrrolidne	1ml	0.28	5.0	0.14%
18	KSR115/DMF	1.20gm	0.48	4.96	0.20%
19	KSR21/A-241/085	0.25gm	0.23	5.5	0.5%
20	KSR59/ALFAZOSANE	0.20gm	0.50	5.5	1.38%
21	KSR59/STD	1.00 gm	0.11	5.46	0.06%
22	KSR59/001/22 PURE	1.04gm	0.70	5.46	0.37%
23	KSR01/A-240/161 OLC	0.25gm	1.95	5.59	4.28%
24	KSR21/A-241/111 S-I SOLID	0.20gm	0.03	5.59	0.08%
25	KSR32/PBF/LOT-1/25/04/22	0.25gm	0.08	5.42	0.17%

Table 1:sample example of water content

4 Ultra-violet visible spectroscopy.

4.1. Introduction.

Absorption spectroscopy includes UV-Visible spectroscopy.

In UV-Visible spectroscopy, there are two sorts of regions: ultra-violet and visible.

Ultra -violet spectrum (200-400 nm).

Visible area (400-800 nm).

The excitation of electrons from the ground state to the excited state is caused by UV light absorption.

Ultra-violet spectrum is divided into two parts: UV area (200-400 nm) and the Vacuum UV (10-200 nm).

The Lambert-Beer's law is used in UV-Visible spectroscopy.

4.2 Instrumentation of UV-Visible spectrophotometer.

There are two types of spectrophotometers on the market.

1 spectrophotometer with a single beam.

2 spectrophotometers with double beam.

Light source: for the visible range, a tungsten filament lamp is used in the UV range, hydrogen and deuterium lamps are utilised.

Monochromator: it is an optical apparatus that selects the light of single range wavelength band.

Sample cell: the UV range necessitates the use of quartz band.

Detector: photomultipliers and silicon photodiodes serve as detectors.

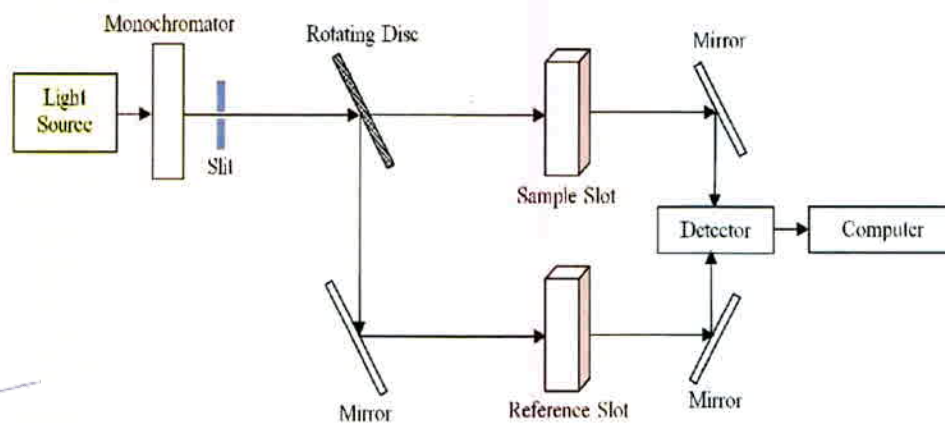


Fig 2: Schematic diagram of UV-Visible spectrophotometer.

4.3 Advantages.

An UV light spectrophotometer has the advantage of being quick to analyse and simple to operate.

4.4 Disadvantages.

The time it takes to prepare to utilise a UV-Visible spectrometer is biggest disadvantage.

Any external light, electronic noise, or other pollutants that could interfere with the spectrometer's readout.

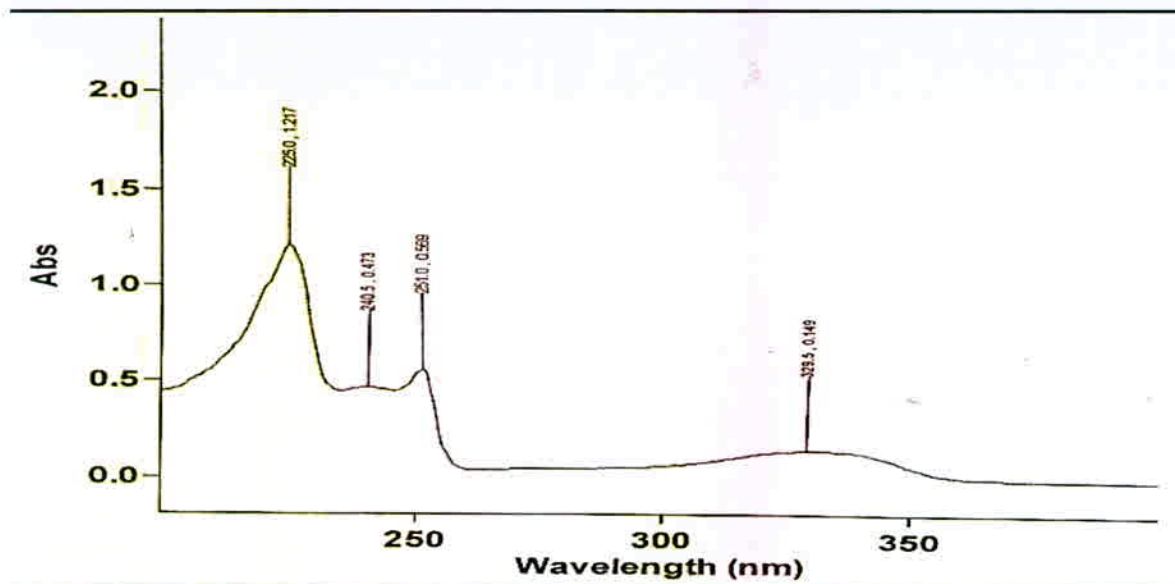
4.5 Application

UV-Visible spectroscopy is a technique used in analytical chemistry to determine the concentration of various analytes in a solution.

Technique can be used to study both solids and gases. It can be used to determine the molar concentration of a solute. Beer law is used to calculate molecular weight. It can be also used to investigate the compound's linearity.

4.6 Sample example of UV-Visible spectroscopy

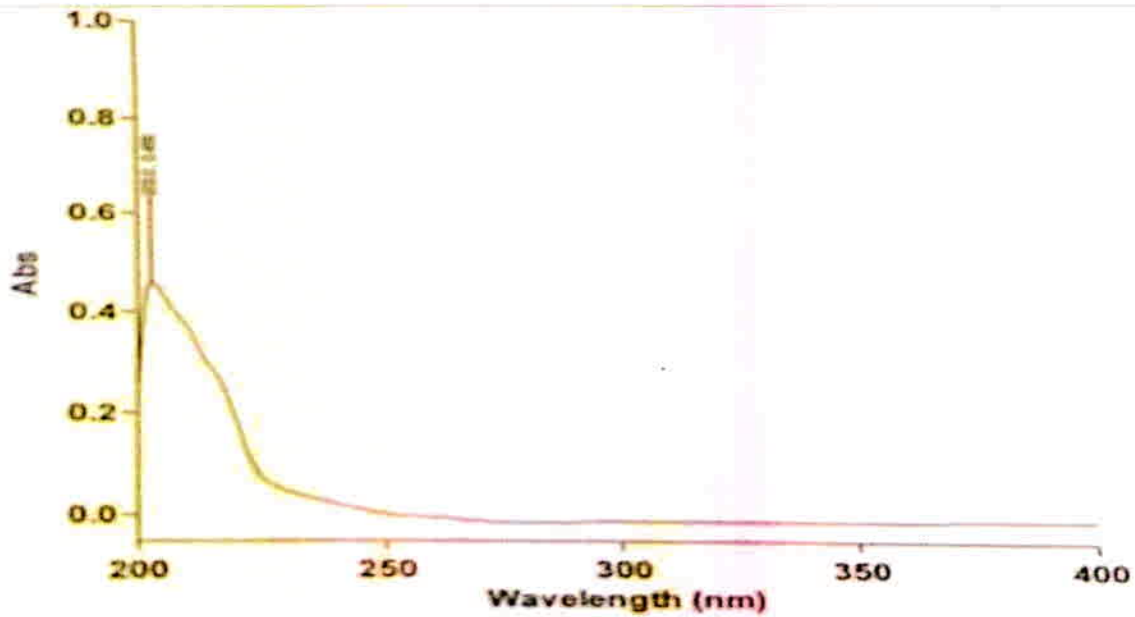
1 KSR125-A-237-083 SOLID.



$\lambda_{\text{max}} = 225.0 \text{ nm}$ and absorption is 1.217, diluent is ACN.

Fig 3:UV spectrum of KSR125-A-237-083 SOLID.

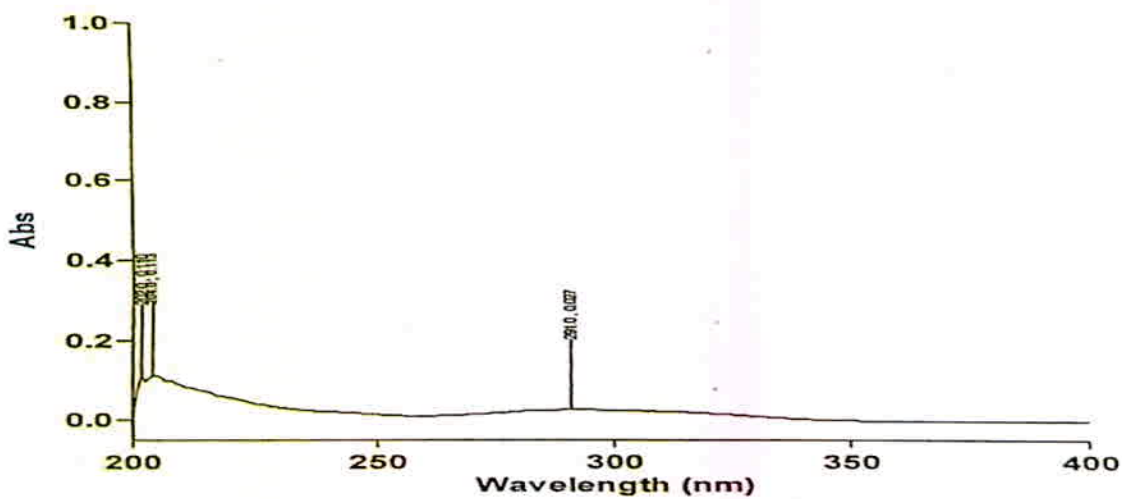
2 KSR21-A-241-009-ST-I



λ max=203.0 nm and absorption is 0.459, diluent is water

Fig 4:UV spectrum of KSR21-A-241-009-ST-I.

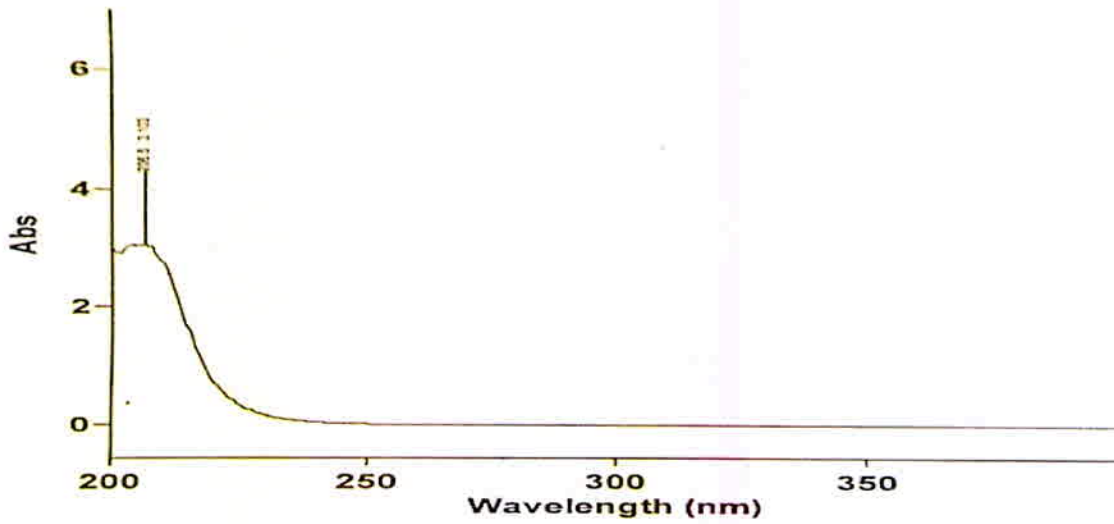
3 KSR21-A-241-019 S-II



λ max= 204.0 nm and absorption is 0.113, diluent is water

Fig 5:UV spectrum of KSR21-A-241-019 S-II.

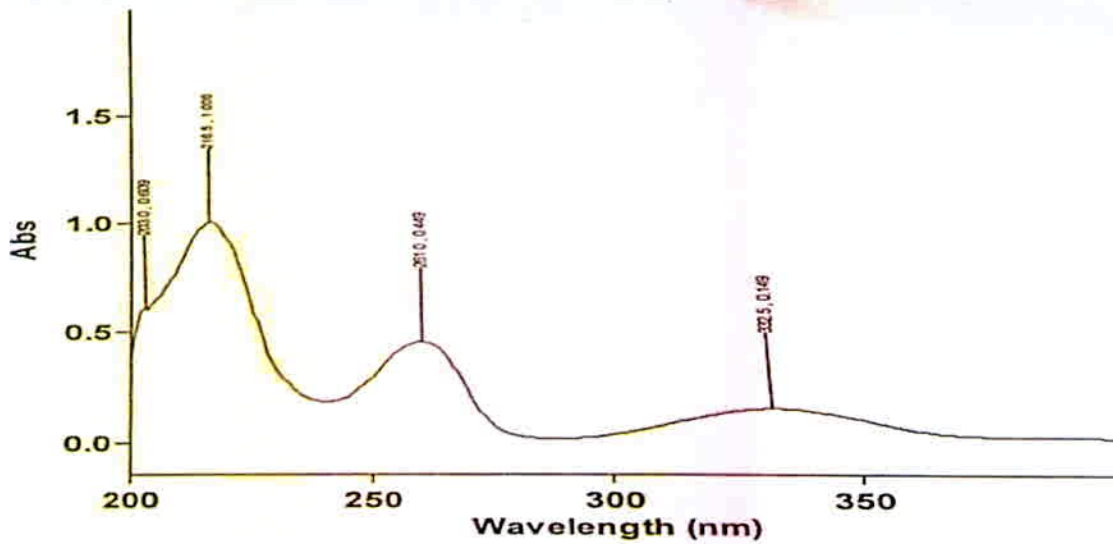
4 KSR90-A-271-125 S-I.



λ max=206.5 nm and absorption is 3.103, diluent is water

Fig 6:UV spectrum of KSR90-A-247-125 S-I.

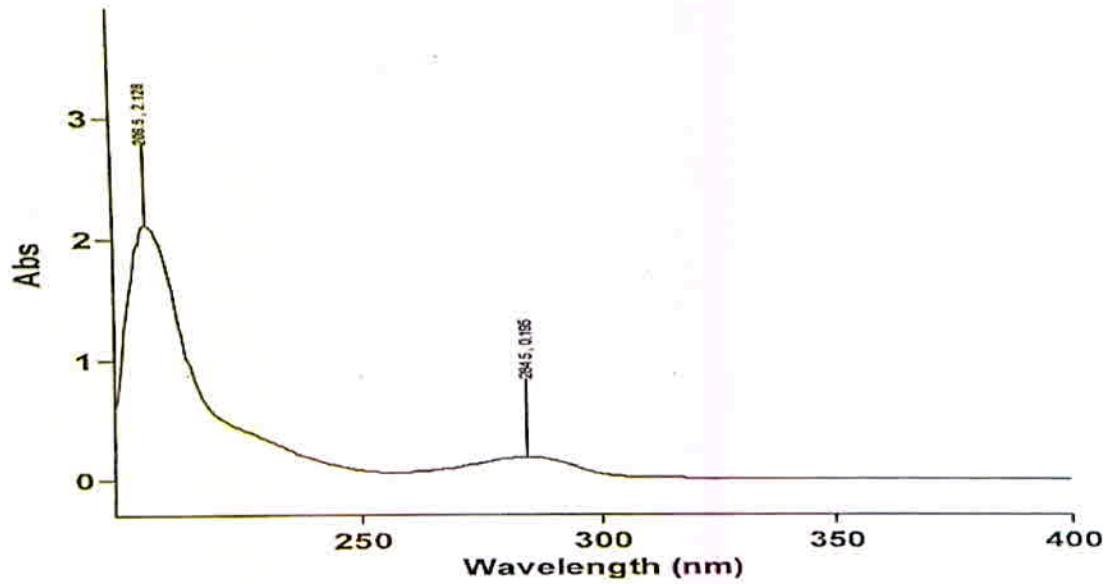
5 KSR115 S-I.



λ max=216.5 nm and absorption is 1.006, diluent is methanol.

Fig 7:UV spectrum of KSR115 S-I

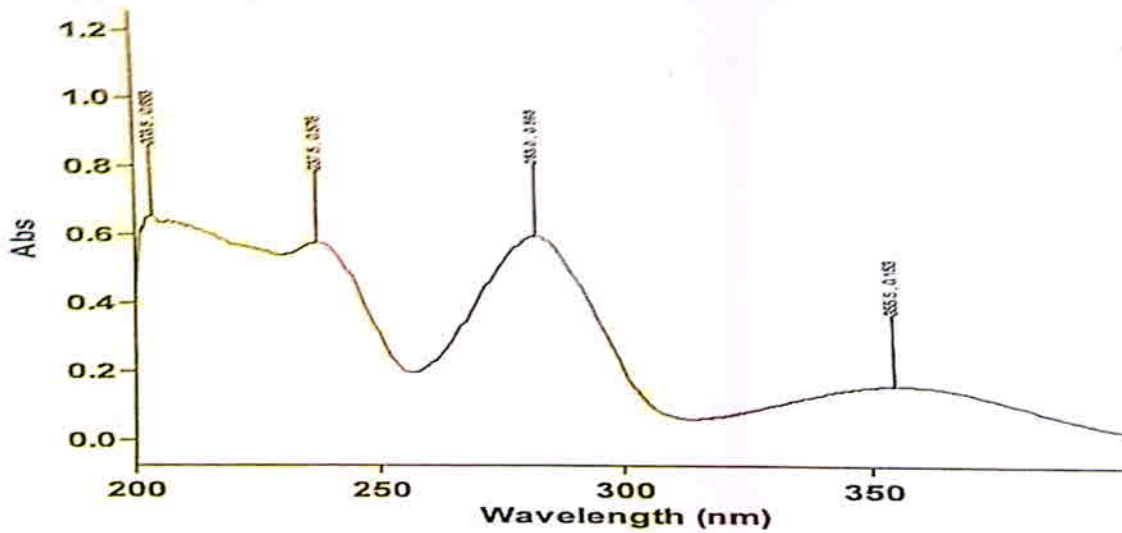
6 KSR115 S-II 10 PPM



λ max =206.5nm and absorption is 2.128, diluent is methanol.

Fig 8:UV spectrum of KSR115 S-II 10 PPM

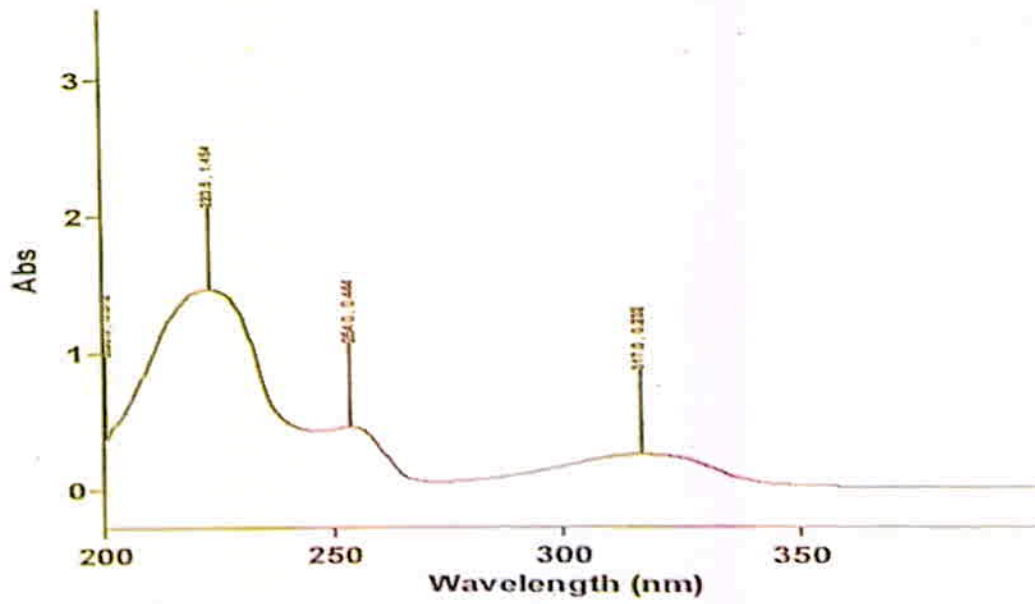
7 KSR115 S-III 10 PPM



λ max =203.5nm and absorption is 0.653, diluent is methanol.

Fig 9:UV spectrum of KSR115 S-III 10 PPM.

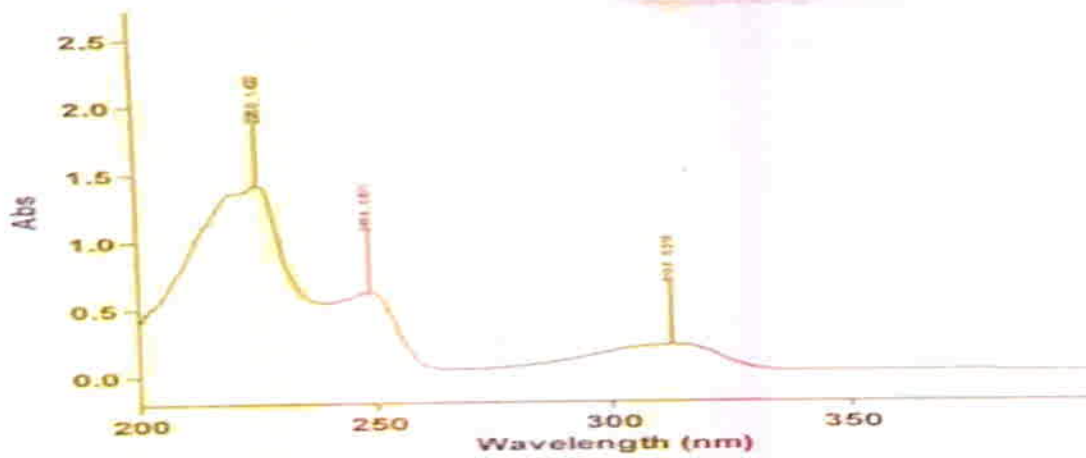
8 KSR115 S-IV 10 PPM.



$\lambda_{\text{max}} = 233.5\text{nm}$ and absorption is 1.454, diluent is methanol.

Fig 10:UV spectrum of KAR115 S-VI 10 PPM.

9 KSR115 S-V 10 PPM.



$\lambda_{\text{max}} = 226.0\text{nm}$ and absorption is 1.422, diluent is methanol.

Fig 11:UV spectrum of KSR115 S-V 10 PPM.

5 IR spectroscopy.

5.1 Principal.

The premise behind IR spectroscopy is that molecular absorb certain frequencies that are distinctive to their structure.

5.2 Introduction.

IR radiation have wavelength ranging from **12500 cm⁻¹ to 10 cm⁻¹**.

In IR region

Near IR (**12500 cm⁻¹ to 4000 cm⁻¹**)

Mid IR (**4000 cm⁻¹ to 400 cm⁻¹**)

In a mid IR, functional group region (**4000 cm⁻¹ to 1500 cm⁻¹**)

Figure print region (**1500 cm⁻¹ to 400 cm⁻¹**)

Far IR (**400 cm⁻¹ to 10 cm⁻¹**)

IR spectroscopy based on the molecule's absorption of IR radiations, which causes vibration in the molecule.

Vibration in the molecule 2 types of vibration.

Stretching (symmetric and asymmetric).

Bending (scissoring, rocking, wagging, twisting)

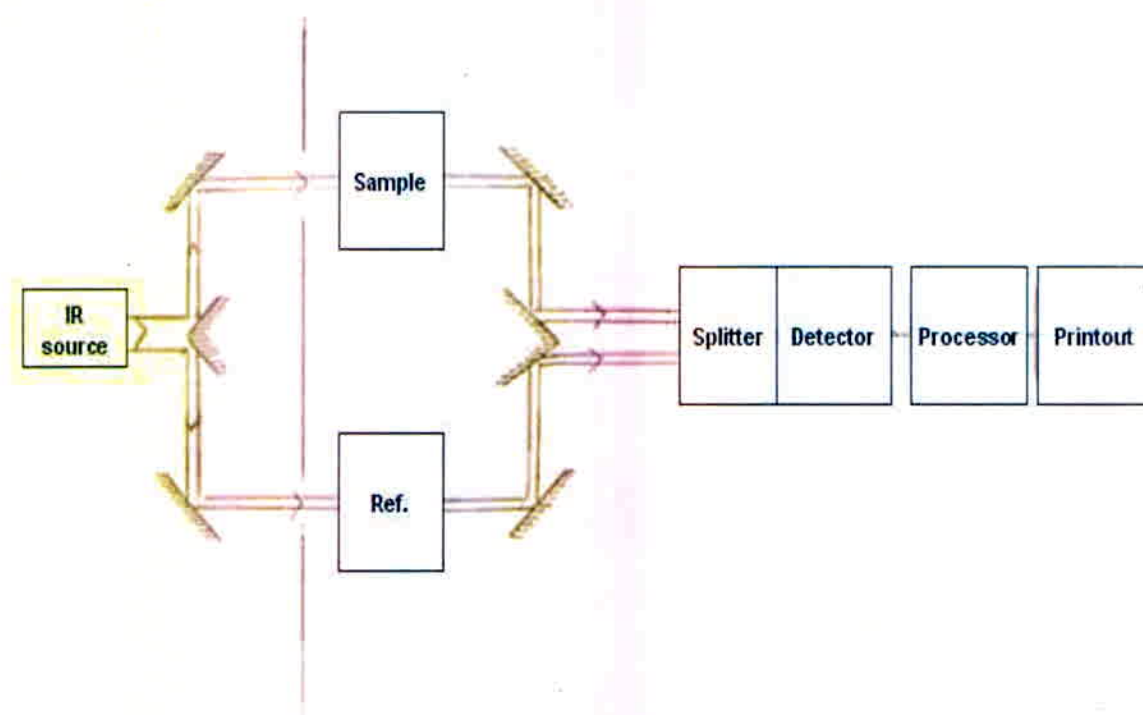


Fig 12: Schematic diagram of IR spectrophotometer.

5.3 Application of IR spectroscopy.

The quantitative determination of diverse compound using IR spectroscopy is based on determining the concentration of one of the compound's functional groups.

If there is a mixture of hexane and hexanol, for example the hexanol can be identified by measuring the amount of absorption by the OH bond. The concentration of hexanol can be calculated using Beer-Lambert's law.

5.4 Limitation of IR spectroscopy.

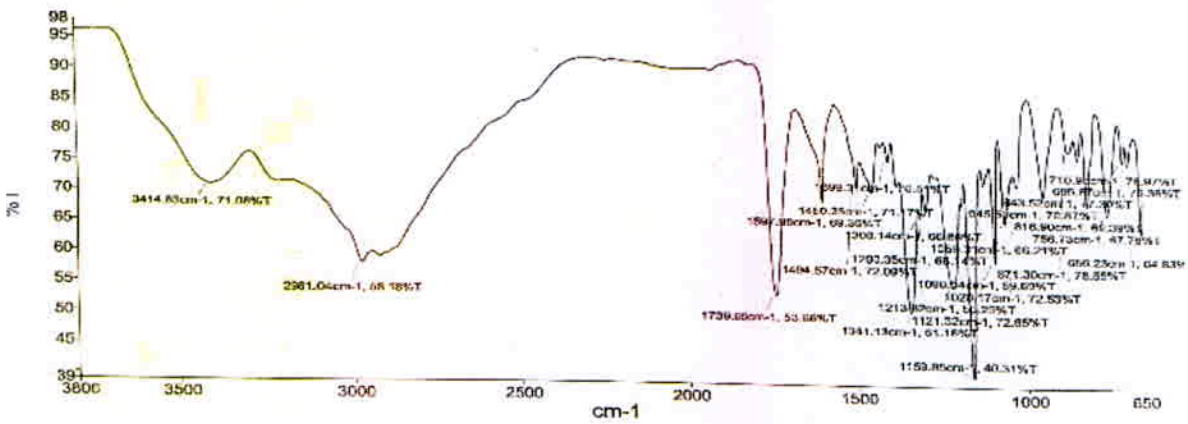
IR spectroscopy can not determine the molecular weight of a molecule (unless in exceptional circumstances). IR spectroscopy, in general, does not reveal the relative positions of different functional groups on a molecule.

It is impossible to tell whether an unknown substance is a pure compound or a mixture of compounds based on a single IR spectrum.

A blend of paraffins and alcohols, for example will produce the same IR spectrum as higher molecular weight alcohols.

5.5 Sample example of IR spectroscopy.

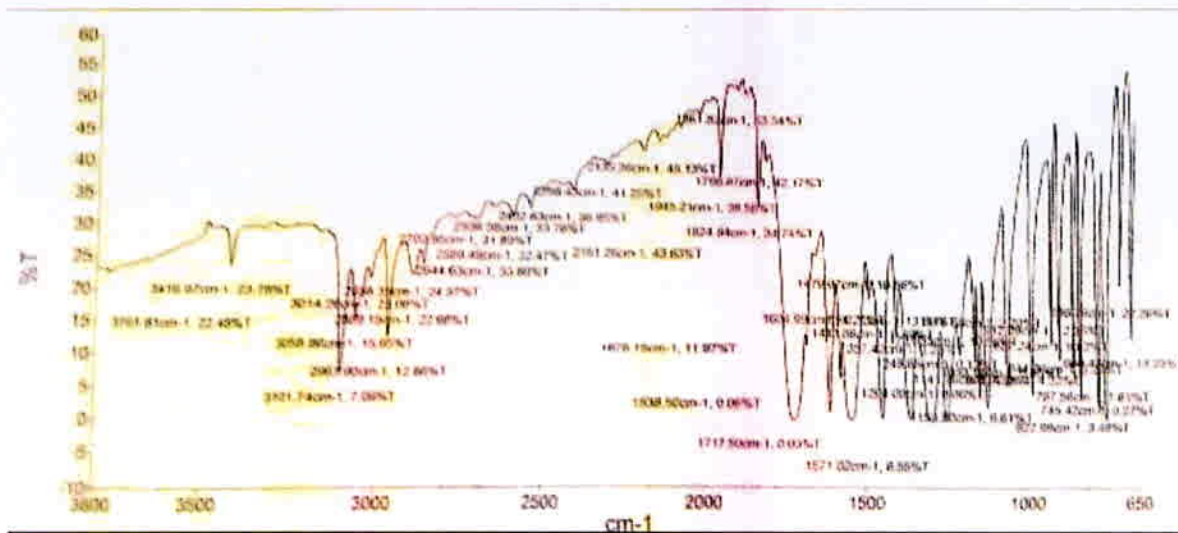
1. KSR113-A-236-S-V



IR in KBr.

Fig 13:IR spectrum of KSR113-A-236-S-V.

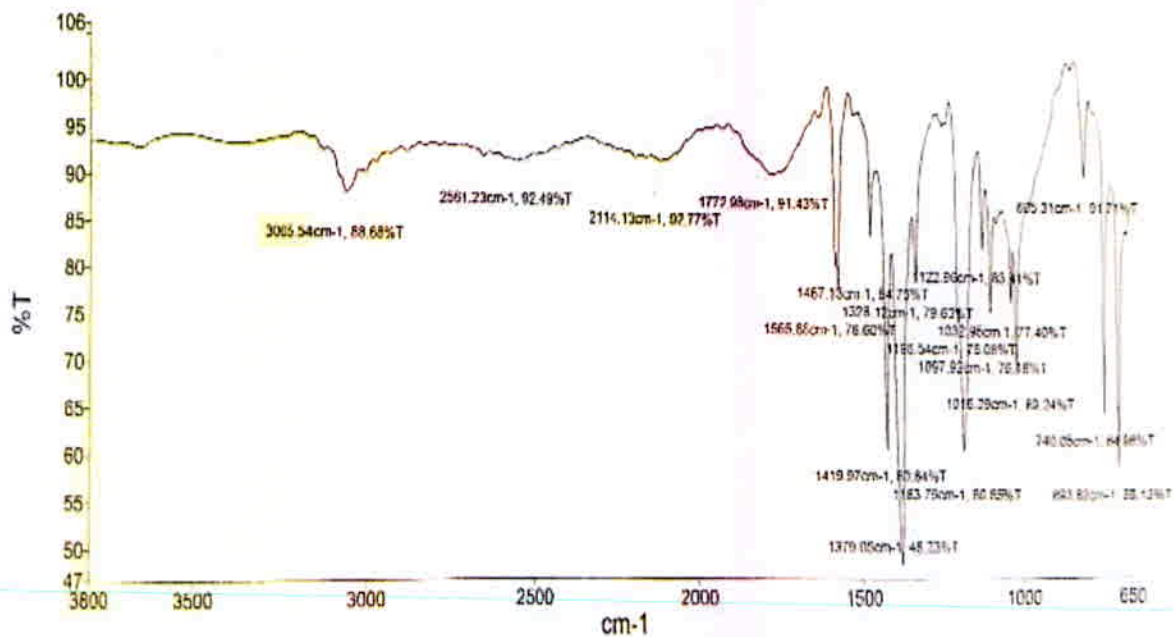
2.KSR101-A-243-007 S-I



IR in KBr.

Fig 14:IR spectrum of KSR101-A-243-007 S-I.

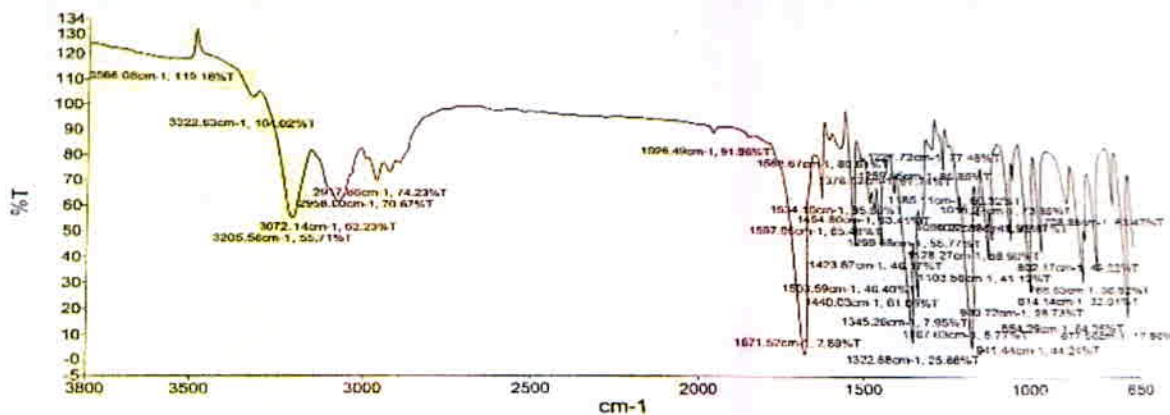
5.KSR93-A-222-017



IR in KBr.

Fig 17:IR spectrum of KSR93-A-222-017

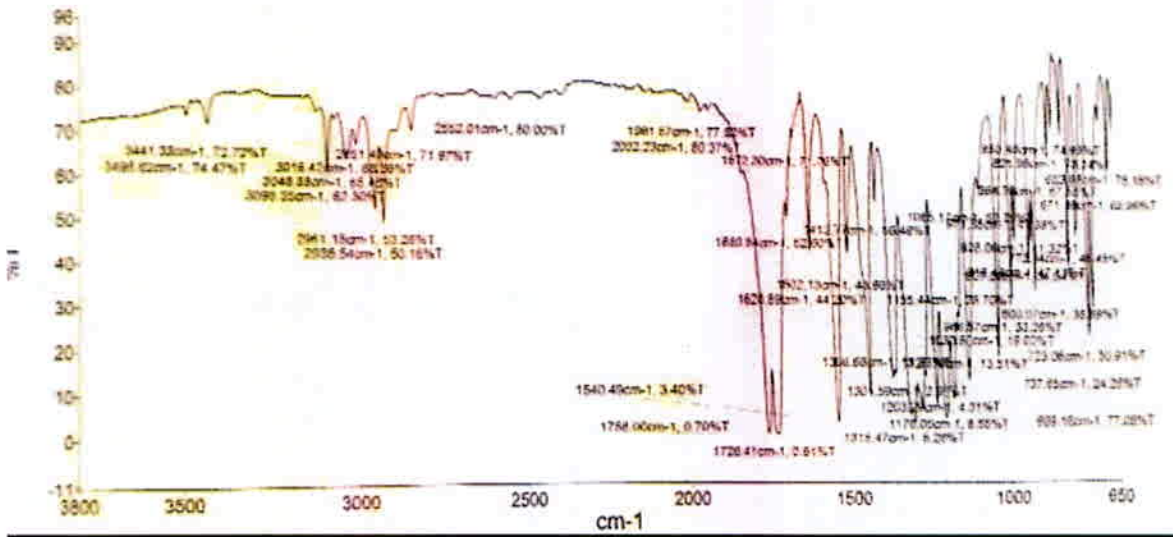
6.KSR113-A-236-S-IV-050



IR in KBr.

Fig 18:IR spectrum of KSR113-A-236-S-IV-050

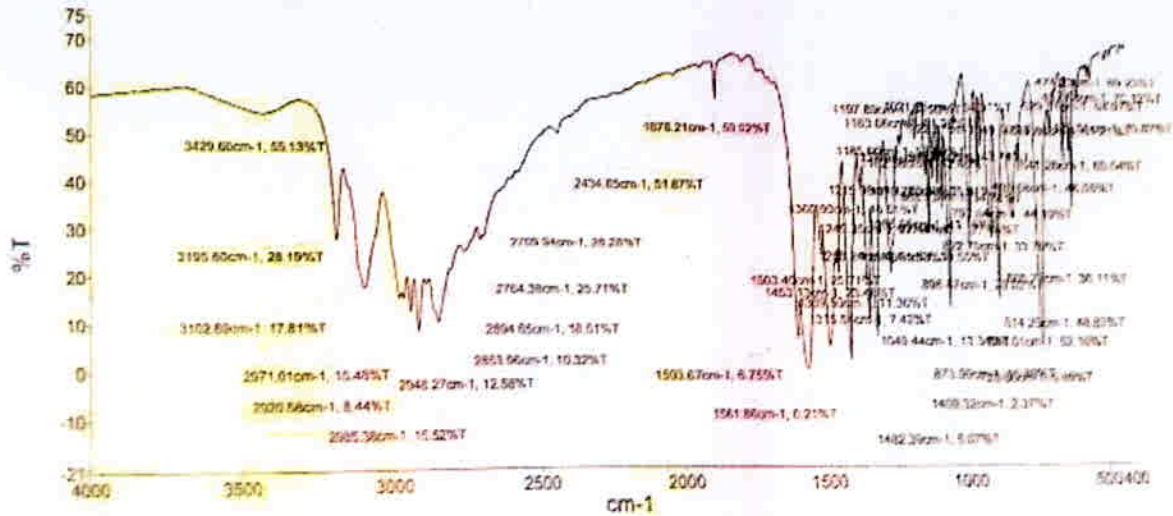
7.KSR101-A-243-009 S-II



IR in KBr.

Fig 19:IR spectrum of KSR101-A-243-009 S-II

8.KSR01-A-043-043 IMP-C

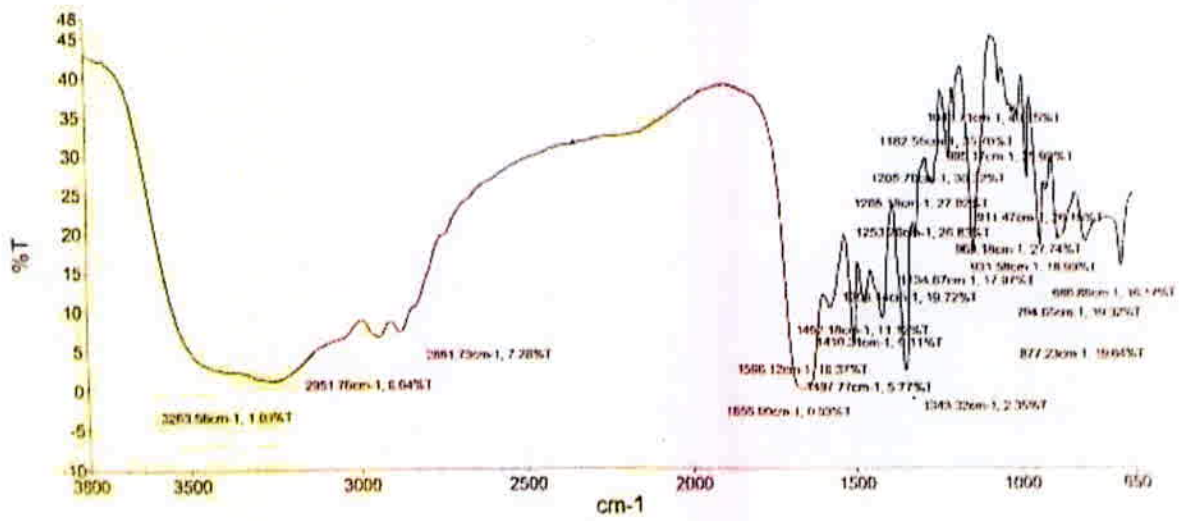


IR in KBr.

Fig 20:IR spectrum of KSR01-A-043-043 IMP-C

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9.KSR113-A-236-S-III-062



IR in KBr.

Fig 21:IR spectrum of KSR113-A-236-S-III-062



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1. INTRODUCTION OF ANALYTICAL CHEMISTRY

Analytical chemistry is the branch of the chemistry in which cope with the employment of instrument and which are applicable to isolate, recognize and quantify matter. Classical methods and instrumental method is the main two part of the analytical chemistry. Classical methods including quantitative analysis and qualitative analysis in manual way.

Qualitative analysis includes identification of any compound in the substance. Methods such as a distillation, extraction, precipitation, color, reactivity and ray meter. Quantitative analysis makes use of mass and volume to measure the amount of substance. Gravimetric and volumetric analysis is a part of this method.

Instrumental method is the most advance methods in analytical chemistry. With the help of instrumental method quantitative and qualitative analysis can be possible at a same time.

In instrumental method advance chromatographic method, spectroscopic method, electrophoresis, conductometry method, flame photometry method, and many more advance hybridized techniques....

2. APPLICATION AND SCOPE OF ANALYTICAL CHEMISTRY

In pharmaceutical industries, analytical chemistry poses importance in giving idea about the compound's purity as well as its separation out desired compound. Analysis of drug help to determine self-life of drug. Any adulterants presents in the drug, dissolution of the drug and also help in quantifying the drugs.

In agricultural society attention is needed to be given to its quality as it is the various analysis for soil testing, water testing, harvest crop testing is one with the help of analytical instrument.

Environmental pollution is taken is control by testing sample of air, water etc....

Medical studies carried based on analytical studies. Bio-analytical branch keeps an eye on analysis carried out in biological field.

13C-NMR spectroscopy is used in polymer analysis and cosmetic analysis.

Quality of food and beverages supplied in market are first well tested will developed analytical method.

Analytical study ensures that quality of the matter synthesized. Wide scope of analytical chemistry is seen in near future.

MAHARAJA UNIVERSITY

Analysis of Pharmaceutical ingredients by Karl Fischer Titration, UV Visible spectroscopy and IR spectroscopy

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Name of Student/s: Parth Arambhadiya

Enrollment No./s: 92000216007

Student's Mail ID:- parth.arambhadiya709826@marwadi ^{University.ac.in}

Student's Contact No.: 8160038141

Institute Name: Marwadi University

Course Name: Master of Science

Branch Name: Chemistry

Theme of Title: Drug Analysis

Title of Thesis/Project: Analysis of pharmaceutical ingredient by
Karl-Fischer titration, UV-visible spectroscopy
and IR-spectroscopy.

Particulars	Guide/Supervisor Details	
	Guide/Supervisor's Detail	Co-Guide/Co-supervisor's Detail (if any)
Name :	Dr. Sabera Bijami	
Institute :	Marwadi University	
Mobile No. :	95750 21053	
Sign :		


❖ REVIEW-I

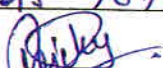
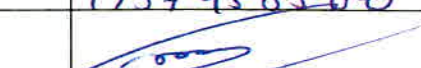
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Review Date: 21/02/2022

Title: Analysis of Pharmaceutical Ingredient by Karl-Fischer titration, UV-Visible Spectroscopic and IR spectroscopy

1. Appropriateness of title with proposal. (Yes/No) yes
2. Whether the selected theme is appropriate according to the title? (Yes / No) yes
3. Justify rational of proposed research. (Yes/ No) yes
4. Clarity of objectives. (Yes/ No) yes


Sr. No.	Comments given by review panel (Please write specific comments)	Modification done based on Comments
1.	Do literature in proper way for all instrumentation	Done
 (Guide's Remarks) Sign. After making modification based on comments		

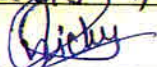

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Institute :	Manwadi University	Manwadi University
Mobile No. :	95285 70780	9737 958500
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❖ **REVIEW- II**

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The appropriateness of the major highlights of work done; State here itself work progress status, required improvements/changes required for final submission.		
1.	Required total experiential condition for UV - analysis.	Done
2.	Give prototype calculation for result.	Done
 (Guide's Remarks/Sign. After making modification based on comments)		

Particulars	Review Panel	
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Institute :	Manwadi University	Manwadi University
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❖ REVIEW- III

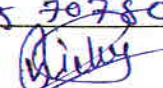
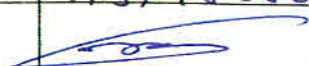
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ii)	State here itself if work can be approved with some additional changes.	
iii)	Main reasons for approving the work.	
iv)	Main reasons if work is not approved.	
1.	All Sugessions are incorp- orated in to the project	Done
 (Guide's Remarks/Sign. After making modification based on comments)		

Please tick on any one (mention reason for the same in above comment boxes)

- Approved for final submission
- Approved with suggested recommended changes
- Not Approved

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❖ FINAL REVIEW/SUBMISSION (VIVA/JURY -Exam)



Enrollment No. of Student: _____

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	All the given suggestions were incorporated & calculative data is appropriate for consideration of project.

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- Not Approved

Particulars	Details of Examiners:	
	Expert 1	Expert 2
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Institute :	Marwadi University	Marwadi University
Mobile No. :	98245 70780	973795 8500
Sign :		

Head,
Department of Chemistry,
Marwadi University, Rajkot

