# CUSTOMER MASTER DATA MANAGEMENT

**A PROJECT REPORT**

*Submitted by*


## AKHILA M V (TKM21MCA-2005)


**to**

## The APJ Abdul Kalam Technological University

***In partial fulfillment of the requirements for the award of the degree of***

**MASTER OF COMPUTER APPLICATION**



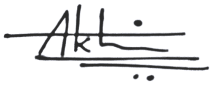
Thangal Kunju Musaliar College of Engineering
Kerala

**DEPARTMENT OF COMPUTER APPLICATION**


**MAY 2023**

# DECLARATION

I undersigned hereby declare that the project report on **CUSTOMER MASTER DATA MANAGEMENT**, submitted for partial fulfillment of the requirements for the award of degree of Master of Computer Application of the APJ Abdul Kalam Technological University, Kerala is a bonafide work done by me under supervision of **Dr. Nadera Beevi S**. This submission represents my ideas in my own words and where ideas or words of others have been included,I have adequately and accurately cited and referenced the original sources. I also declare that I have adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact or source in our submission. I understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been obtained. This report has not previously served as the basis for the award of any degree, diploma, or similar title by any other University.



Kollam

16-05-2023

**AKHILA M V**

**DEPT. OF COMPUTER APPLICATION TKM COLLEGE OF ENGINEERING**

**KOLLAM**

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## CERTIFICATE

This is to certify that the report entitled **CUSTOMER MASTER DATA MANAGEMENT** submitted by **AKHILA M V** (TKM21MCA-2005) to the APJ Abdul Kalam Technological University in partial fulfillment of the Masters degree in Computer Application is a bonafide record of the project work carried out by her under our guidance and supervision. This report, in any form, has not been submitted to any other University or Institute for any reason.

Internal Supervisor Head of the Department External Examiner

**Incture Technologies Pvt Ltd**
No 27/ B, Konappana Agrahara, Begur Hobli, Electronic City
Bangalore KA 560100 IN
**CIN – U72200KA2005PTC037156**

Phone: +91-80-67833033
E-mail: info@incture.com
**www.incture.com**

17 May 2023

Dr. Fousia M Shamsudeen
Head of Department
Master of Computer Applications
TKM College of Engineering
Kollam - 691005
Kerala

Dear Madam,

Akhila M V is undergoing Academic Internship for a duration of 6 months from 9th January 2023 onwards.

During her internship, she has been trained on 'Java' and 'Groovy Script'. She is currently working on Master Data Management and Jira related projects.

She is interning under the leadership of Himanshu Gupta and is being mentored by Surekha Avinasi Muthusamy.

Thank you,
For Incture Technologies (P) Ltd.

Hanumantrao Kulkarni
Senior Manager – Learning & Development
hanumant@incture.com

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First and foremost, I thank GOD almighty and my parents for the success of this project. I owe sincere gratitude and heart full thanks to everyone who shared their precious time and knowledge for the successful completion of my project.

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**AKHILA M V**

# ABSTRACT

**CUSTOMER MASTER DATA MANAGEMENT** is a spring boot application designed to manage customer data and also the different levels of approvals. It have a workflow for approvals and a set of work rules to be considered for approvals.It allows the hierarchy of officials to approve the customer request as per the rules of approvals.

CUSTOMER MASTER DATA MANAGEMENT actually works on SAP and the overall works are done in Java.Currently customer data is managed in SAP ECC.By implementing the Master Data Management application I am converting it in to S4/HANA.Thus I can customize the customer data.And thereby prioritize customer data.

Using this application customer data can be managed wisely and requirement of each customer can be fulfilled accordingly.At each level customer data will flow in a hierarchical way and thereby approvals can be maintained in a proper manner.Customer will get mail at each stage of approvals.Also officials in each stage will provide reasons for approving/rejecting and updations of properties and there by customer can know about those things.

This application stores the details of approved/non-approved details of customer data in database.So that the complete details of customer data can be managed in a single platform.

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# Chapter 1

# Introduction

**CUSTOMER MASTER DATA MANAGEMENT** project is a powerful Spring Boot application designed to manage customer data, approvals, workflows, and work rules using a hierarchical approval process based on predefined approval rules and levels. The purpose of this project report is to provide a detailed overview of the application, its design, and implementation, and to showcase the benefits it brings to organizations seeking to streamline their customer data management process.

Cherrywork is a major product of Incture which is a suite of digital applications designed to deliver business value to enterprises with agility, security, and scalability while addressing complex requirements.It enables the efficient management of various aspects of the organization, including employees, customers, products, spend, sales, finance, and IT.

Intelligent Task management (ITM) is a part of Cherrywork.Intelligent Task Management is a robust solution that integrates multiple systems, workflows, and associated tasks into a unified workbench. It provides users with easy access to all the necessary data, ensuring effective task management.

As a part of ITM I am developing this application called CUSTOMER MASTER DATA MANAGEMENT.This application is able to improve customer data management, prioritize customer data, ensure proper approvals, and maintain a detailed history of approved and non-approved customer data.

Overall, this report will provide a comprehensive overview of the CUSTOMER MASTER DATA MANAGEMENT project and its capabilities, making it an essential resource for anyone interested in streamlining their customer data management process.

## 1.1 Existing System

CUSTOMER MASTER DATA MANAGEMENT application is being developed to improve the existing customer master data management system. Currently, customer data is managed in SAP ECC.SAP ECC, while a widely used enterprise resource planning (ERP) system, has some drawbacks. One of the biggest drawbacks is its outdated architecture, which can make it difficult and time-consuming to customize and integrate with other systems. Additionally, SAP ECC is known for its complexity and high cost of ownership, requiring specialized skills and resources to manage and maintain.Finally, SAP ECC is not optimized for cloud computing, which can limit its scalability and flexibility. As a result, many organizations are considering upgrading to newer SAP systems, such as SAP S/4HANA, which offer improved functionality, flexibility, and performance.However, the system lacks a workflow for approvals and work rules to be considered for approvals. The current system does not allow for hierarchy of officials to approve the customer request as per the rules of approvals. This makes the management of customer data cumbersome and time-consuming.

## 1.2 Proposed System

The proposed system for developing the CUSTOMER MASTER DATA MANAGEMENT application is a modern and efficient platform that utilizes the latest SAP technology to manage customer data in a user-friendly manner. The system will be built on a Spring Boot framework and will use the S4/HANA database to manage customer data more efficiently than the outdated SAP ECC system. This modern ERP system offers enhanced functionality, flexibility, and performance, enabling businesses to streamline their operations, make better decisions faster, and adapt to changing market conditions more quickly.

The proposed system will feature a workflow for approvals and a set of work rules to be considered for approvals. It will allow for a hierarchy of officials to approve customer requests as per the rules of approvals. The application will use Java programming language to implement the workflow and work rules, ensuring a seamless and efficient customer master data management process.

With the proposed system, customer data can be customized, and customer requirements can be prioritized, enabling businesses to cater to their customers' needs more efficiently.

The hierarchical flow of customer data and approvals will ensure that requests are managed efficiently, and customers receive emails at each stage of approval. Officials in each stage will provide reasons for approving/rejecting and updating properties, keeping customers informed about the status of their requests.

The proposed system will store all approved/non-approved details of customer data in a database, allowing for the management of complete customer data in a single platform. The user-friendly interface and efficient workflow will make the customer master data management process quick and easy to manage, improving customer satisfaction and reducing operational costs.

## 1.3 Objectives

Characteristics and Capabilities comprise:

- Simplicity in maintaining customer data.
- Search and filter data as needed.
- Maintaining proper workflow for approvals.
- Providing proper work rules and work flow for approvals.
- Proper mail message to customers in each stage.
- Each stages of approvals from authorities are defined and no confusions in managing customer data.
- Maintains proper data of approved and unapproved customers.

## 1.4 Company Profile

Incture Technologies is a digital systems company that provides cutting-edge solutions and services to businesses worldwide. Our areas of expertise include enterprise applications, cloud technologies, and intelligent automation, among others. Incture Technologies' mission is to help organizations achieve digital transformation and improve their operational efficiency, productivity, and customer experience through innovative solutions. We have a global presence

and have been recognized by various industry experts for their exceptional services and customer-centric approach.

### 1.4.1 Products

- **Cherrywork Studio**

  Cherrywork Studio is a low-code development platform designed to facilitate the creation of enterprise-grade applications and workflows. It provides developers with a collection of reusable components, pre-built templates, and an intuitive drag-and-drop interface to accelerate development. With Cherrywork Studio, developers can easily design and customize applications without writing extensive code. Furthermore, it includes a suite of automated tests that guarantee the excellence of the application prior to deployment.

- **Cherrywork Engage**

  Cherrywork Engage is a customer engagement platform that facilitates businesses in establishing strong connections with their customers. It provides tools for automating customer journeys, tracking customer interactions, and collecting customer feedback. The system permits enterprises to interact with clients via diverse mediums, including social media, chat, and email. With customer data gathered, it helps businesses to gain better insights and understanding of their clients.

- **Cherrywork Insights**

  Cherrywork Insights is a powerful data analytics platform that enables businesses to gain valuable insights into their operations and business processes. With real-time dashboards, reporting, and analytics, businesses can make informed decisions based on accurate data. The platform provides data-driven insights to monitor and enhance operational procedures, as well as predictive analytics to help businesses forecast trends and plan for the future.

- **Cherrywork Connect**

  Cherrywork Connect is an integration platform that helps businesses seamlessly integrate their internal business apps and systems. It provides pre-built interfaces for popular business platforms such as SAP, Salesforce, and Microsoft Dynamics. It enables smooth data transfer between different systems, eliminates data silos, and improves overall system efficiency. Additionally, it offers a unified view of data from multiple systems.

### 1.4.2 Services

- **Enterprise Resource Planning (ERP) Services**

  Incture offers ERP consulting, implementation, and support services aimed at enhancing organizational business processes, optimizing supply chain management, and improving operational efficiencies.

- **Intelligent Automation Services**

  Incture offers intelligent automation services such as Robotic Process Automation (RPA) and Artificial Intelligence (AI) to automate repetitive tasks, minimize errors, and enhance productivity. Their digital process solutions help organizations improve their operations and achieve business goals.

- **Automation Services**

  Incture leverages technologies like BPM, low code, and workflows to help companies automate their business processes end-to-end, from customer onboarding to order fulfillment. This helps increase efficiency and productivity while reducing errors.

- **Cloud Services**

  Incture offers cloud services, including consulting, migration, and managed services, to support businesses in adopting and utilizing cloud technologies such as AWS, Azure, and Google Cloud Platform. Their services assist in streamlining operations, reducing costs, and enhancing scalability and flexibility.

- **Mobile Application Development Services**

  Incture offers customized mobile application development services to assist organizations in creating mobile apps that enhance customer engagement, increase revenue, and improve employee productivity.

# Chapter 2

# Literature Survey

A literature survey, also known as a literature review, is a process of analyzing scholarly sources related to a specific subject. It provides a comprehensive overview of the state of the field, identifying relevant theories, approaches, and gaps in the existing body of knowledge. When conducting a literature review from an audit perspective, the main focus is on evaluating the relevant literature, including information published within a specific time frame.

The literature review is an essential tool for research, often used as a starting point for exploring a particular subject area. Besides identifying critical theories and concepts, a literature review can also highlight gaps in current knowledge and emphasize areas where further research is necessary. By scrutinizing multiple sources, a literature review can provide a more comprehensive understanding of a given topic or issue, enhancing the author's credibility and authority. In some cases, a literature review may involve a meta-analysis, which examines the findings of multiple studies to uncover common patterns or trends.

It's important to note that a literature review is distinct from a research paper or argumentative essay. Instead, it is a focused examination of the existing research and literature on a specific topic.

## 2.1 Purpose of the Literature Review

1. Provides an overview of the current state of knowledge and research in a specific field or topic area.

2. Identifies relevant theories, concepts, and key ideas related to the research question or problem.

3. Helps to identify gaps in the existing body of knowledge and highlight areas where further research is needed.

4. Enables researchers to refine their research questions and identify potential research

methodologies.

5. Provides a foundation for further research and helps to build on existing knowledge.

6. Enhances the credibility and authority of the author by demonstrating their familiarity with the current research and debates in the field.

7. Can help to identify potential limitations and biases in the existing literature and inform the development of more effective research designs.

## 2.2 Related Works

### 2.2.1 Java

The paper ”The case for Java as a programming language” gives a thorough defence of the use of Java as a programming language. The essay emphasises how the object- and class-centered coding model of Java encourages highly structured code reuse, saving developers time and effort while assuring that the code is well-organized and simple to understand. Effective code reuse is also made possible by this design philosophy, which is a big benefit for developers. The study also underlines how because Java is less difficult than C++, it is easier to learn and utilise. A number of Java features, including inheritance, robustness, type safety, access modifiers, null pointer checking, array bounds checking, memory management, multi-threading, garbage collection, and security, are thoroughly examined in the study [13].

The article also gives a general overview of how memory management strategies employed in earlier programming languages like Lisp and Smalltalk served as the foundation for Java’s garbage collection system. Java learning and usage are made easier by this feature’s automated memory release. The paper also addresses how Java is a strong programming language with many built-in security features, making it a great option for creating dependable and safe applications. The study also highlights how Java is less prone to errors and problems than other programming languages because to its type safety and array bounds checking features [13].

In conclusion, ”The case for Java as a programming language” makes a strong case for Java’s use in programming. In addition to showcasing the advantages of Java’s object- and class-centered coding paradigm and its robustness, the article offers a thorough review of Java’s

features and design philosophy. The essay argues that Java is easier to learn and use than other programming languages and highlights how its built-in security features and garbage collection system make it a great choice for creating dependable and safe software [13].

The paper ”Java in real-time applications” addresses the potential of the Java programming language for usage in real-time applications as well as its existing restrictions. The article explains how specific POSIX1.b features that are essential for real-time applications can be implemented in Java. The article also emphasises the necessity for Java to be developed further in order to satisfy the requirements of real-time applications. This advancement might entail the language gaining new capabilities or additional study and development [14].

The study offers a thorough evaluation of Java's advantages and disadvantages for real-time applications. The benefits of Java are explored, including its support for multiple threads and object-oriented programming approach. The study also notes that Java has several restrictions, including those related to trash collection and resource access. The report comes to the conclusion that more research and development are required to solve these restrictions in order to fully utilise Java for real-time applications [14].

Overall, the study offers insightful information about using Java for real-time applications and emphasises the necessity of more research in this field. It is obvious that Java has the capacity to be an effective tool for real-time applications, but more effort is required to make sure it can satisfy the requirements of this industry. The article offers a helpful structure on which future research and development initiatives might be built [14].

### 2.2.2 REST API

The study ”An Analysis of Public REST Web Service APIs” looks into how businesses use web-based services and assesses how well 500 REST web service APIs adhere to REST architectural best practises. The study discovered that, despite the widespread usage of JSON and software-generated documentation, there is substantial variation in service implementation and adherence to suggested practises. The study's conclusions can help professionals create guidelines and standards for higher-quality services and researchers pinpoint areas for further study to enhance the provision of dependable services [1].

In conclusion, the study sheds light on the state of REST web service APIs today and identifies opportunities for development. The study can help developers create more robust and trustworthy services by offering a thorough analysis of the various implementation practises and

adherence to advised standards. The results can also be used as a starting point for additional research in this field, with the ultimate objective of raising the standard of REST web service APIs [1].

The article ”A study of the effectiveness of usage examples in REST API documentation” focuses on the difficulties in developing and updating REST API documentation using usage examples. In order to illustrate the productivity problems developers encounter while working with APIs without usage examples, the authors ran an experiment with seasoned software engineers. The findings demonstrated that when developers lack access to usage examples, they frequently make more mistakes and expend more time troubleshooting. The study came to the conclusion that usage examples can greatly boost developer satisfaction and success rates while lowering errors in the REST API documentation [3].

The authors advise adhering to suggested practises for REST API documentation in order to make sure that usage examples are provided, based on the study’s findings. The functionality of the API should be described in clear and succinct terms, consistent language should be used, documentation should be arranged logically, and sample code and usage examples should be provided. Following these guidelines will enable API developers to produce better documentation that will aid API client developers in making better use of the API [3].

The article ”Spring Boot based REST API to Enhance Data Quality Report Generation for Large-scale Scientific Data: A Case Study of ARM Data Centre” explores the use of Spring Boot, a Java-based platform, to create a REST service API intended to improve the generation of data quality reports in the context of extensive scientific data. By providing automatic setup options and unifying necessary Spring-related technologies into a single dependency, Spring Boot streamlines the development process. This reduction reduces the complexity of building Spring-based applications and makes it easier to distribute the application simply as war or jar files [5].

The implementation within the ARM Data Centre at Oak Ridge National Laboratory, where Spring Boot was used to create a service-oriented architecture (SOA)-based REST service API, is the subject of the article. Scientists can submit reports using this API via a user form or a command-line interface. The ARM Data Centre effectively expedited the development and deployment of the API by implementing Spring Boot, creating a more effective and user-friendly method for producing data quality reports for huge scientific data sets. The essay emphasises the benefits of using Spring Boot in the field of scientific data management overall,

highlighting its effectiveness in facilitating the creation and deployment of RESTful services [5].

The ”RESTful API Automated Test Case Generation” article discusses the difficulties in testing RESTful web services and suggests a thorough automated testing strategy. Traditional testing techniques for RESTful APIs are frequently time-consuming and labor-intensive, necessitating a large amount of manual work from developers. The authors suggest an evolutionary method that lets programmers directly access and test their own code while creating test cases on the fly [6].

The suggested technique provides a systematic method to prioritise and reward effective tests by evaluating test cases based on criteria like code coverage and fault-finding. The EVOMASTER open-source application was used by the authors to test their methodology on three RESTful services, and they were able to find 38 actual faults in the tested systems. However, when compared to test suites that were manually built, the automated approach showed less code coverage. The authors recognise the need for additional study in order to improve code coverage and maximise the efficacy of the automated testing technique [6].

In conclusion, the essay highlights the possibilities of automated white-box testing for RESTful APIs and demonstrates how well the suggested methodology works to find errors. Although the automated method revealed areas for code coverage enhancement, it offers developers a potential way to accelerate and optimise the testing process for RESTful web services [6].

### 2.2.3 Hibernate

Hibernate is a popular tool for managing database interactions in application development, and the article ”Exploration of a realisation pattern of system based on Hibernate” focuses on the construction of a system using Hibernate. The paper demonstrates a particular method for creating applications based on Hibernate and its realisation pattern, offering developers advice and suggestions on how to utilise this technology successfully. The goal of this article is to give developers a better understanding of Hibernate’s capabilities and how to use them to create reliable and effective systems [10].

The major goal of this document is to guide and advise developers on how to construct a system utilising Hibernate. It describes the various facets of the Hibernate realisation pattern and how programmers may use it to create high-quality systems. The article is a helpful tool

for those who are new to using Hibernate or who want to hone their current abilities. It gives a thorough grasp of Hibernate's capabilities and how it contributes to the creation of dependable and effective systems [10].

The Object-Relational Mapping (ORM) framework Hibernate is the focus of the article "Application research on a persistent technique based on Hibernate". Developers can interface with databases using object-oriented programming principles thanks to Hibernate. The paper outlines a specific implementation programme that employs persistence with Hibernate. By analysing the persistent theory and Hibernate-related technologies, the aim is to help developers who seek to use Hibernate in their application development projects [15].

The programme utilised in the study gives developers who are unfamiliar with Hibernate insight into how the framework can be used in a practical setting. Developers can take advantage of Hibernate's benefits, like increased productivity and maintainability, decreased complexity, and portability, by learning how to install it in a project. The article is a helpful resource for developers looking to incorporate Hibernate into their application development process because it also examines implementation issues and offers strategies to address them [15].

The construction of a financial management data report system utilising the J2EE platform and JasperReport as the development tool is presented in the paper "Design and Implementation of the Hibernate Persistence Layer Data Report System Based on J2EE". In order to satisfy user needs, the system integrates Hibernate and focuses on the JasperReport report creation process. The paper emphasises the merits of Hibernate while discussing the advantages of object-oriented databases. IReport is used to generate the database structure, and Hibernate's object-relational mapping capabilities allow a conventional relational database to be transformed into persistent objects. With the ability to map persistent objects to the underlying data structure, this makes it possible to provide services like complicated data querying, searching, and report production [9].

The data report system delivers a strong and effective solution for financial management by utilising the J2EE platform and utilising the skills of Hibernate and JasperReport. The system's flexibility and scalability are improved by using object-oriented databases and Hibernate's object-relational mapping features. IReport's integration makes it easier to design the database's structure, and JasperReport makes sure that reports are produced to a high standard. Overall, the essay demonstrates how well the selected technologies work together

to provide a comprehensive data report system for financial management in a J2EE context [9].

### 2.2.4 Spring Boot

The benefits of adopting the Spring framework while creating J2EE Web applications are covered in the article ”Spring framework for rapid open source J2EE Web application development: a case study”. The success of any web application project depends on effective and accurate development practises, as the essay emphasises. The essay makes the case that employing the Spring framework can simplify the creation process, boost output, and lessen complexity. A case study that demonstrates how the Spring framework provides necessary services and is less intrusive than Enterprise Java Beans (EJB) is used in the article to highlight this. The case study demonstrates how the Spring framework's capacity to boost output and cut complexity can lead to a more productive and economical development process [2].

Overall, the essay promotes the usage of the Spring framework while creating J2EE Web applications, highlighting its potential to boost efficiency and productivity. This claim is supported by a case study that illustrates how the Spring framework can streamline and declutter the development process. In the end, this may result in lower costs and more successful project outcomes [2].

The research report ”An Analysis of the Significance of Spring Boot in the Market” examines the Java Spring Boot framework in depth as well as its associated applications. The paper offers a summary of the many applications and potentials of Spring Boot by looking at a number of research papers and articles. The literature review specifically addresses the construction of scalable enterprise Java applications, the architectural designs used by Spring Boot, and the implementation of RESTful web services. The benefits of adopting Spring Boot over alternative frameworks for creating scalable information management systems that can handle massive volumes of data are also highlighted in the study [4].

In conclusion, the paper is a useful resource for people curious about Spring Boot and its place in the market. It gives a comprehensive overview of the framework's capabilities and its ability to build scalable, high-performance systems. Developers and companies trying to enhance their software development procedures and build reliable, scalable systems that can manage complicated data requirements may find this material beneficial [4].

The importance of selecting an appropriate development framework for the design and implementation of web applications is emphasised in the article. Frameworks can increase

scalability and portability, speed up the development process, and ultimately cut expenses. The SSM (SpringMVC + Spring + Mybatis) framework, a popular and well-liked choice for creating online applications, is the subject of the article [11].

The SSM framework has a number of benefits, such as excellent performance, quick development, and support for a variety of databases. The document also offers instructions for setting up and utilising the framework successfully, as well as a thorough explanation of the design and parts of the framework. The article offers a helpful resource for web developers looking to expedite their development process and create high-quality applications by emphasising the significance of selecting the appropriate framework and giving a thorough introduction to the SSM framework [11].

### 2.2.5 S4/HANA

The importance of ERP systems in enterprises and its limitations in adapting to the fast changing digital landscape are highlighted in the paper ”SAP S/4 HANA Framework: I-ERP towards Digital Transformation”. Traditional ERP systems need to be completely redesigned in order to stay up with the evolving business models because they are not designed to manage the demands of digital platforms. This study focuses on SAP ERP and its transition to SAP S/4HANA, an intelligent ERP system that has a number of advantages, including a quicker time to market and lower expenses for IT infrastructure [7].

With the help of the digital platform SAP S/4HANA, organisations may optimise their operations by combining many services into a single system. With its in-memory database and extensive analytics tools, businesses can swiftly react to changes and make data-driven choices. This paper focuses on SAP S/4HANA’s capabilities and advantages, including real-time data processing, predictive analytics, and a streamlined IT architecture. The need of switching to intelligent ERP systems, such as SAP S/4HANA, is emphasised in the paper in order to maintain competitiveness in the digital environment [7].

The study ”SAP HANA Distributed In-Memory Database System : Transaction, Session, and Metadata Management” focuses on the effective management of distributed query processing using SAP HANA database system. The system has been created with a focus on offering full support for distributed query facilities, which is a vital design component from the outset, the study emphasises. An overview of the system’s capabilities, including data distribution, metadata caching, and query routing, is given in the paper. Additionally, it digs

into the particulars of many subjects, such as SAP HANA-specific features and methods that may not be present in more conventional disk-based database systems. Overall, the paper offers a thorough grasp of how SAP HANA can manage distributed query processing to successfully handle huge databases and a range of workloads [8].

In conclusion, the study emphasises how SAP HANA is built to efficiently handle distributed query processing. It explains how the system can scale and support huge databases and a variety of workloads thanks to functions like query routing and metadata caching. The paper also discusses special capabilities and methods that distinguish SAP HANA from older disk-based database systems [8].

The ”Analysis of SAP Development Tools and Methods” study is concerned with the use of Enterprise Resource Planning (ERP) systems, particularly SAP, and how they promote collaboration between various functional domains and industry solutions by utilising the most recent information technology, architecture, and methodology. While newer capabilities are gradually taking the place of older ones, SAP systems continue to rely on more established, durable technologies. Regrettably, there is a lack of learning strategies that integrate old and contemporary technologies. By demonstrating how obsolete development tools and processes can still be useful in the most recent SAP architecture, the study tries to close this gap. Thus, the study offers students a chance to learn more about these antiquated but effective methods and equipment [12].

In conclusion, the article emphasises the significance of bridging the gap between legacy and modern technologies, especially in ERP systems like SAP, to make sure that students are given the skills they need to properly use both modern and legacy systems [12].

# Chapter 3

# Methodology

**CUSTOMER MASTER DATA MANAGEMENT** application is developed using the Spring Boot framework and follows a modular design approach. The application consists of different modules, such as customer data entry, approval workflow, rule engine, and notification system.

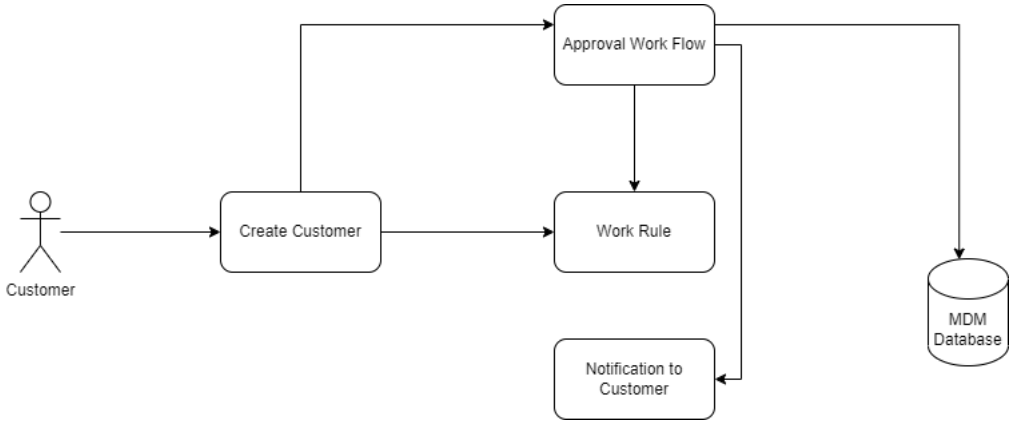


Figure 3.1: Customer Master Data Management Work Flow

Figure 3.1 defines the workflow of CUSTOMER MASTER DATA MANAGEMENT. The customer data entry module allows authorized users to enter customer data and submit it for approval. The approval workflow module implements a hierarchical approval process, where the customer data is approved by officials at different levels based on their roles and responsibilities. The rule engine module defines the different approval rules based on various criteria, such as customer type, region, and transaction value.

The notification system module sends email notifications to the customers and officials at each stage of the approval process. The system also allows officials to provide reasons for approving/rejecting the customer data and update the properties of the data.

The application uses a database to store the details of approved and non-approved customer data. The database schema is designed to store all the required details of the customer data, such as customer name, address, contact details, and transaction history.

The application is deployed on the SAP S/4HANA platform to leverage its capabilities in managing customer data. The application uses Java-based APIs to interact with the SAP

S/4HANA system for data retrieval and updation.

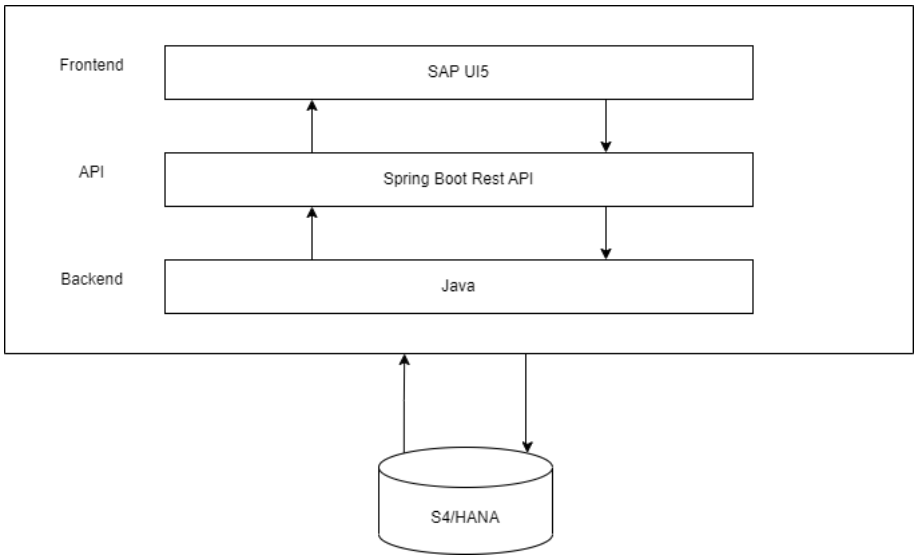


Figure 3.2: Login System Model

The methodology for Customer Master Data Management is a combination of the Spring Boot framework, rule engine, hierarchical approval process, and notification system, which enables efficient management of customer data in the SAP S/4HANA platform.Figure 3.2 shows the overall system model of CUSTOMER MASTER DATA MANAGEMENT.

## 3.1 Key Features of Customer Master Data Management

- Improving the maintenance of customer data.
- Improved search and filtering capabilities to efficiently retrieve data.
- Establishing and maintaining a streamlined workflow for approvals and implementing appropriate work rules for the approval process.
- The flow of data to each level of approval is clearly defined, ensuring no confusion in managing customer data.
- Proper work rules are established for approvals at each stage, enabling a smooth workflow for the approval process.
- Automated confirmation emails are sent to customers at every stage of the process, ensuring transparency and accountability in managing customer data.

- Allowing administrators to download details of customer in Excel format as needed.

## 3.2 Module Description

### 3.2.1 Create Module

The create module of the CUSTOMER MASTER DATA MANAGEMENT system is responsible for managing the process of customer registration. The module includes a customer creation form that requires the user to enter the necessary details as per the work rules provided. Once the customer submits their data, it is passed through a workflow that manages the approval process according to a set of work rules and hierarchy of officials.

During this process, the customer data is evaluated based on various conditions and properties, such as credit limit, payment terms, etc. The system updates the properties accordingly, and the customer data is passed through the hierarchy of officials for approval. The officials at each level can approve or reject the customer request, and if they reject it, they must provide a reason for doing so.

Once the customer data is approved, the system stores the details in the database, and the customer is notified via email. If the customer request is rejected, the system updates the status of the customer data as non-approved. This ensures that all customer data is managed in a single platform, and the status of each customer request can be easily tracked.

### 3.2.2 Change/Update Customer Data

The Change/Update module is designed to enable customers to update their data according to the work rules. Customers can evaluate the reasons for rejection and make the necessary changes to their data. However, it is mandatory to follow the work rules, such as selecting the states in a drop-down based on the selected country. This module provides customers with the flexibility to correct any mistakes in their data and keep it up-to-date.

### 3.2.3 Request Bench - Master Data - Admin Report

The Request Bench module allows authorized users to request confidential data from the admin. The admin has the ability to download customer data in Excel format based on specific requirements. They can apply filters to the customer data based on various conditions and

download only the required data. This feature is only available to the admin to ensure the security of the data. Other users or officials can also request customer data in Excel format from the admin based on their requirements.

### 3.2.4 Inbox - Tasks

The Inbox module in Customer Master Data Management allows for communication between the admin, officials, and customers. Officials can allocate tasks such as verifying customer profiles to other officials, and also request confidential data from the admin through this module. Customers can also interact with officials through this module. It serves as a central platform for all communication related to customer data management, ensuring transparency and efficiency in the process.

### 3.2.5 Work Rule

The Customer Master Data Management project's Work Rule module is a crucial collection of requirements that all users must adhere to, not a standalone module. These guidelines specify the prerequisites and requirements that must be satisfied at each step of the approval process in order for customer data to be approved. It makes it easier to manage and prioritise client data by ensuring that the entire process is carried out in a standardised and consistent manner. The system can assure the correctness and completeness of customer data by following the work standards, enhancing the data's overall quality and making it simpler to base business choices on it.

## 3.3 System Specifications

This section outlines the software and hardware specifications that are deemed necessary for the system based on its requirements.

### 3.3.1 Hardware Requirements

- Processor: Minimum 1 GHz (Recommended 2GHz or more)
- Hard Drive: Minimum 4 MB (Recommended 6 GB or more)

- Memory (RAM): Minimum 1 GB (Recommended 4 GB or above)
- Internet connection

### 3.3.2 Software Requirements

- SAP UI5 - Front End
- Java – Spring Boot REST API - Back End
- S4/HANA - Database
- Spring Tool Suite - Tool
- Postman - Tool
- Windows,Mac,any - OS
- Microsoft Edge,any - Browser

### 3.3.3 Software Description

- **SAP UI5**

  SAP UI5 is a renowned JavaScript-based framework that offers a cutting-edge and user-friendly design, making it an ideal choice for developing web applications on SAP platforms. It excels in responsive design, allowing applications to seamlessly adapt to various platforms and devices. The framework provides a wide range of pre-built UI controls that can be customized and enhanced to meet specific application requirements. This flexibility empowers developers to create visually appealing and feature-rich applications that seamlessly integrate with SAP systems like SAP S/4HANA, leveraging the robust backend services provided by SAP. SAP UI5 supports different development paradigms, including the Model-View-Controller (MVC) pattern and the Fiori design principles, ensuring a structured and efficient development process. Overall, SAP UI5 provides developers with a solid foundation to build innovative, reliable, and highly efficient web applications tailored specifically for SAP systems.

- **Java – Spring Boot REST API**

  Java Spring Boot is a powerful framework made especially for building RESTful APIs.

Developers may design robust and scalable API apps quickly and effectively because to its simplicity and productivity capabilities. The development process is streamlined by Spring Boot, which prioritises convention over configuration by doing away with the need for repetitive code and complex configuration. Assuring versatility and adaptation to various project requirements, it smoothly interfaces with well-known Java libraries and frameworks. The development of CRUD operations on resources is made simpler by the framework's built-in functions for managing HTTP queries, data validation, and conversion. Additionally, Spring Boot provides other capabilities like security, monitoring, and testing, improving the RESTful API's reliability and general quality. In conclusion, Java Spring Boot is a solid option for building RESTful APIs, enabling developers to focus on designing the business logic of their applications.

- **S4/HANA**

  SAP S/4HANA is an ERP software meant to aid businesses in optimizing their operations and enhancing their efficiency. It is built on an in-memory database platform and features a simplified data model that enables real-time processing of large data sets. S/4HANA provides a wide range of business functions, such as finance, procurement, sales, manufacturing, and supply chain management.

  One of the key features of S/4HANA is its reporting capabilities. Reports in S/4HANA allow businesses to retrieve and analyze data from various modules and functions in real-time. The reports can be sorted and customised to display only the information that is necessary for the user. S/4HANA reports offer users a clear and succinct view of their data and are made to be simple to use. For additional analysis and sharing, they can also be exported to a variety of file formats, including PDF and Excel. Businesses may use S/4HANA to acquire insightful information about their operations and make data-driven decisions that can increase their productivity and profitability.

- **Spring Tool Suite**

  An integrated development environment (IDE) called Spring Tool Suite (STS) is made specifically for leveraging the Spring Framework to create enterprise-level Java applications. It offers a full range of tools and capabilities that streamline the development process and aid programmers in producing high-caliber apps fast and effectively.

  STS is built on top of the Eclipse IDE and includes additional plugins and features

specific to the Spring Framework. It provides a range of powerful tools, including a visual layout editor for building user interfaces, a debugger, and a code analysis tool. A number of Spring technologies, including Spring Boot, Spring MVC, and Spring Data, are also supported by STS.

Support for Spring Boot, a well-liked platform for creating web applications in Java, is one of STS's standout features. STS provides a range of tools and templates to help developers build and deploy Spring Boot applications quickly and easily. It also includes a range of tools for managing dependencies, creating test cases, and running and debugging applications.

Overall, STS is a powerful tool for building enterprise-level Java applications with the Spring Framework. Its comprehensive set of tools and features make it an essential tool for any Java developer looking to build high-quality applications quickly and efficiently.

- **Postman**

  Postman is a popular API development tool makes it easier to create, test, and document APIs. It functions as a platform for collaboration that streamlines the entire creation of APIs, handling everything from creating API calls to testing and debugging.

  Developers can easily make API calls with Postman's user-friendly interface and test them right away in real time. The tool includes useful components including API documentation, monitoring, and automated testing. Additionally, Postman makes it simple for team members to share APIs with each other, as well as with clients and partners outside the company.

  Additionally, Postman provides a wide range of features that improve the productivity of developers' workflows, such as environment and variable management, team collaboration tools, and integrations with other tools like Jenkins, GitHub, and AWS.

  In conclusion, Postman offers a complete array of services that help with developing, testing, and documenting APIs, which speeds up and simplifies API development.

## 3.4 System Design

System design is an essential aspect of project development that involves defining the architecture, components, and modules of a system, as well as the interactions and dependencies between them. It aims to ensure that the system can meet the required functional and non-functional requirements, including scalability, performance, reliability, and security.

A system design document typically includes a high-level system architecture diagram, a detailed description of each component, and their interactions, along with any relevant algorithms or data structures used. It also covers the chosen technology stack, data storage, and communication protocols. The document should describe how each component interacts with other components and external systems and how data flows through the system.

Due to the fact that it creates the framework for the remainder of the project, the system design phase is crucial. It guarantees that the development team is fully aware of the needs and limitations of the system. Early detection of possible problems also aids in making necessary adjustments prior to the start of the implementation phase. A excellent system design document serves as the project's overall blueprint and should be regularly updated.

The CUSTOMER MASTER DATA MANAGEMENT application is designed as a Spring Boot application that works on top of the SAP system and is developed using Java. The application is designed to manage customer data and approvals using a workflow and set of work rules. The application allows for a hierarchy of officials to approve customer requests based on rules and provides notifications to the customer at each stage of the approval process. The system design includes the conversion of customer data from SAP ECC to S4/HANA to enable customization and prioritization of customer data. The application stores approved and non-approved customer data details in a database to provide a single platform for managing customer data. Overall, the system is designed to efficiently manage customer data and streamline the approval process.

### 3.4.1 System Access Model Design

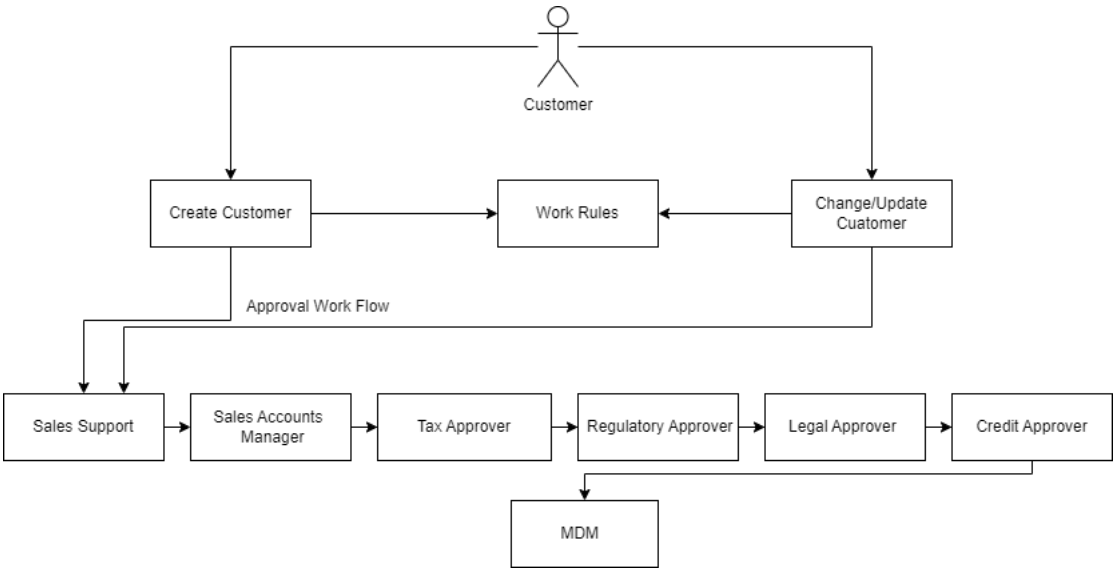


Figure 3.3: System Design

As defined by Figure 3.3, customers can register their information using the CUSTOMER MASTER DATA MANAGEMENT System and update it at any time in accordance with predetermined guidelines. Their information is then reviewed by a hierarchy of officials before being approved or rejected, with each step offering pertinent feedback and recommendations before moving on to the next official. Email is used to notify customers of each update.

Sales Support initiates the approval process by filling up the client information based on search parameters. Prior to the Sales Account Manager, Tax Approver, Regulatory Approver, and Legal Approver using a UI form to amend currency, credit limit, and payment terms and provide permission, regional and worldwide hierarchy, tax numbers, and other details are added. The credit limit and payment terms are then reviewed and authorised by the credit manager, with a corrective job starting if they are not. Prior to syndicating the data to partner functions and informing them of the update, MDM verifies the data. Finally, the S4/HANA database is used to hold all the data.

# Chapter 4

# Result and Discussion

**CUSTOMER MASTER DATA MANAGEMENT** system is designed to manage customer data and approvals using a workflow and set of work rules. It enables officials to approve customer requests as per the rules of approvals, and the hierarchy of officials ensures that approvals are managed in a proper manner. Additionally, the system sends email notifications to the customer at each stage of approval.

One of the major benefits of this system is that it allows for the customization of customer data. By converting the system from SAP ECC to S4/HANA, customer data can be prioritized and managed according to the requirements of each customer.

Furthermore, the system provides a centralized platform for storing approved and non-approved customer data, making it easy to manage and retrieve the complete details of customer data.

Overall, the CUSTOMER MASTER DATA MANAGEMENT system is a powerful tool for managing customer data, approvals, and workflows. It enables businesses to streamline their processes and provide better customer service, resulting in increased customer satisfaction and loyalty.

## 4.1 Testing Methods

Testing is a crucial process that helps ensure that a system operates without errors or issues that may impact users or the organization. The system's performance can be affected by the environment in which it operates, whether it is high-end or low-end. Therefore, testing must be done to identify potential issues and ensure that the system meets the criteria and standards expected by the user or the organization.

### 4.1.1 Unit Testing

Unit testing is a vital step in software development that aims to ensure the quality and functionality of the programme. Unit testing must be performed on each module of the CUSTOMER MASTER DATA MANAGEMENT project to guarantee that it is performing as intended. The create customer and update customer modules can be tested to check if the database is being updated with the correct data by creating dummy objects and sending them to the appropriate API endpoints. To ensure that the ”request bench - master data - admin report” module is functioning properly and allowing data to be downloaded in the required excel format, it is important to create some test data in the database and attempt to download it. The administrator will be able to confirm that the module is functioning as expected and that the required data can be obtained in the correct format thanks to this. The module may next undergo any necessary modifications or improvements based on the results of the testing. Test cases can be written for the Inbox - tasks module to ensure that tasks are being assigned and finished appropriately and that notifications are being given to the users as necessary. Test cases can be made and used to assess the workrule module to make sure the approval and rejection criteria work as expected. Unit testing is essential to guarantee the dependability and performance of CUSTOMER MASTER DATA MANAGEMENT and to identify and resolve any potential issues before they affect the consumers.

### 4.1.2 User Interface Testing

CUSTOMER MASTER DATA MANAGEMENT must do user interface testing to make sure the programme is intuitive to use and visually appealing. Testing for the ”create customer” module should ensure that all fields are present, have clear labels, and are validating user input as intended. The ”update customer” module ought to be simple to understand. Data should be able to be downloaded in the correct format through the ”Request bench - master data - admin report” module. Tasks, including deadlines and statuses, should be shown and managed through the ”Inbox - Tasks” module. The ”workrule” module should also be simple to develop, administer, and update. Overall, the user interface testing should make sure that all necessary functionality is readily available and intelligible, and that the programme is simple to use, intuitive, and aesthetically pleasing.

### 4.1.3 Test Data

Test data can be used to check how well CUSTOMER MASTER DATA MANAGEMENT functions in a variety of modules, including ”create customer,” ”update customer,” ”request bench - master data - admin report,” ”Inbox - tasks,” and ”workrule.” To make sure that the system manages client data and the approval workflow accurately and effectively, test data can replicate various scenarios.

### 4.1.4 Data Validation Testing

CUSTOMER MASTER DATA MANAGEMENT is made to manage customer information and approvals in a structured way. It utilises SAP and was created in Java. The project consists of modules like customer update and creation, bench-master data-admin report request, inbox-tasks, and workrule. To verify the quality and integrity of client data, many types of data validation tests are necessary for each module. Tests must be performed on the ”create customer” and ”update customer” modules to make sure that all necessary fields are filled with accurate and complete information and that any changes to customer data are correctly validated before being saved in the database. The ”inbox-tasks” module needs testing to make sure that all notifications and updates being sent to customers and officials are accurate and comprehensive, while the ”request bench-master data-admin report” module needs testing to make sure that data being pulled from the database is accurate and current. To confirm that all work rules and approval procedures have been correctly implemented and are operating as intended, the ”workrule” module must also be tested. Generally speaking, data validation testing is a crucial part of the client MASTER DATA MANAGEMENT project and is necessary to guaranteeing that client data is correct, comprehensive, and secure.

### 4.1.5 Error Handling

To ensure that the program runs without any errors, the CUSTOMER MASTER DATA MANAGEMENT project employs a variety of error handling strategies. Exception handling, logging, input validation, workflow error handling, and database error handling are some of these mechanisms. Input validation is carried out to prevent data corruption, log4j is used for logging, exception classes are designed to handle particular failures, and workflow error handling is essential because it involves numerous stages and officials. The user is given the

proper error messages for database issues, and the errors are logged for debugging reasons. These techniques aid in the early detection of problems, the identification of their causes, and the implementation of corrective measures.

### 4.1.6 Security Testing

CUSTOMER MASTER DATA MANAGEMENT, a spring boot application created to manage customer data and approvals, places a high priority on security testing. Some techniques that can be used to make sure that the application is safe and client data is secured include vulnerability scanning, penetration testing, authentication and authorization testing, and data encryption testing. Regular security testing is essential to find and fix any potential flaws before they can be used against you.

### 4.1.7 Test Environment

To avoid having any detrimental effects on actual customer data, a separate test environment for CUSTOMER MASTER DATA MANAGEMENT should be set up. It is important to properly test each module, including creating and updating test customers, producing reports, developing test activities, and confirming that approvals adhere to established work rules. It's important to test the email notification feature and approvals workflow. Before deploying the program in the production environment, it is crucial to test it in a separate test environment to make sure it is working properly.

## 4.2 Test Cases

Table 4.1: Test Cases

| Slno | Condition to be Tested | Expected Result | Observed Outcome | Status |
|---|---|---|---|---|
| 1 | Entering valid customer details and clicking 'Save as Draft' in 'Customer Creation' | Details will get stored in database successfully | Details get stored in database successfully | Pass |
| 2 | Entering valid customer details and clicking 'Submit' in 'Customer Creation' | Customer data will sent to ITM for approval. | Customer data sent to ITM for approval. | Pass |
| 3 | Customer creation with empty customer details fields | Error will shown as "Requied Field" | Shown Error as "Requied Field" | pass |
| 4 | Entering numeric values in Name field in 'Customer Creation' | Error will shown as "Invalid data , Required text" | Shown Error as "Invalid data , Required text" | Pass |
| 5 | Entering valid customer details in 'Create Customer' for continue the creation of customer. | Will get the details of the customer searched for and can continue creating the customer. | Got the details of the customer searched for and continue creating the customer. | Pass |

| | | | | |
|---|---|---|---|---|
| 6 | Entering invalid customer details in 'create customer' for continue the creation of customer. | Error will shown as "No customer found" | Shown Error as "No customer found" | Pass |
| 7 | Entering valid customer details in 'Request Bench' for searching particular customer. | Will get the searched customer | Got the details of the searched customer | Pass |
| 8 | Entering invalid customer details in 'Request Bench' for searching particular customer. | Error will shown as "No customer found" | Shown Error as "No customer found" | Pass |
| 9 | Entering valid customer details and clicking 'Save as Draft' in 'Change Customer' | Details will get updated in database successfully | Details get updated in database successfully | Pass |
| 10 | Entering valid customer details and clicking 'Submit' in 'Change Customer' | Customer data will sent to ITM for approval | Customer data sent to ITM for approval | Pass |

## 4.3 Output Screens and Results

1. Dashboard

   Page where user can view the dashboard

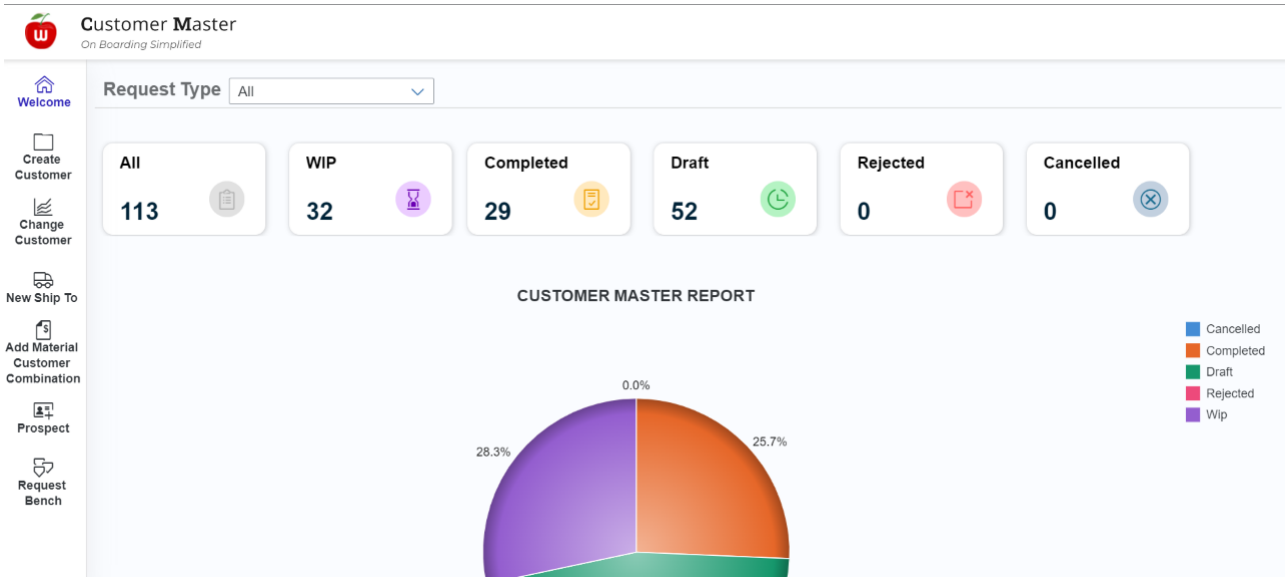


Figure 4.1: Dashboard

2. Partial Completed Customer Creation

   User can continue there customer creation by providing essential feeds

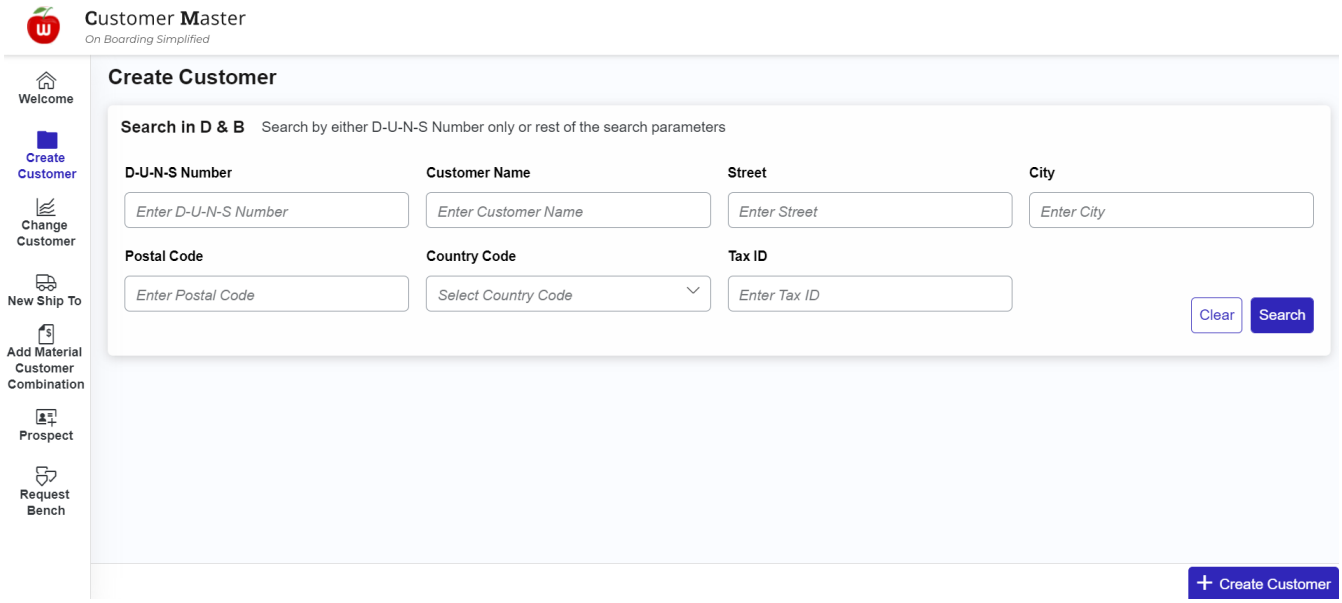


Figure 4.2: Partial Completed Customer Creation

3. Customer Creation Page

   User can create their profile by providing required details

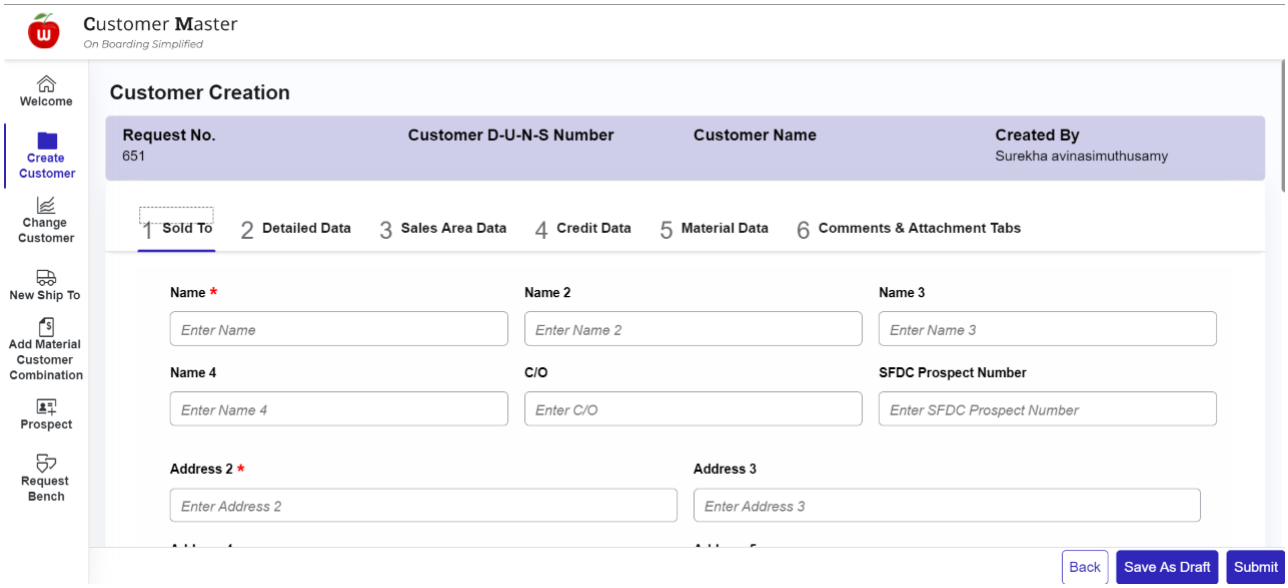


Figure 4.3: Customer Creation

4. Change Customer page

   User can change customer details

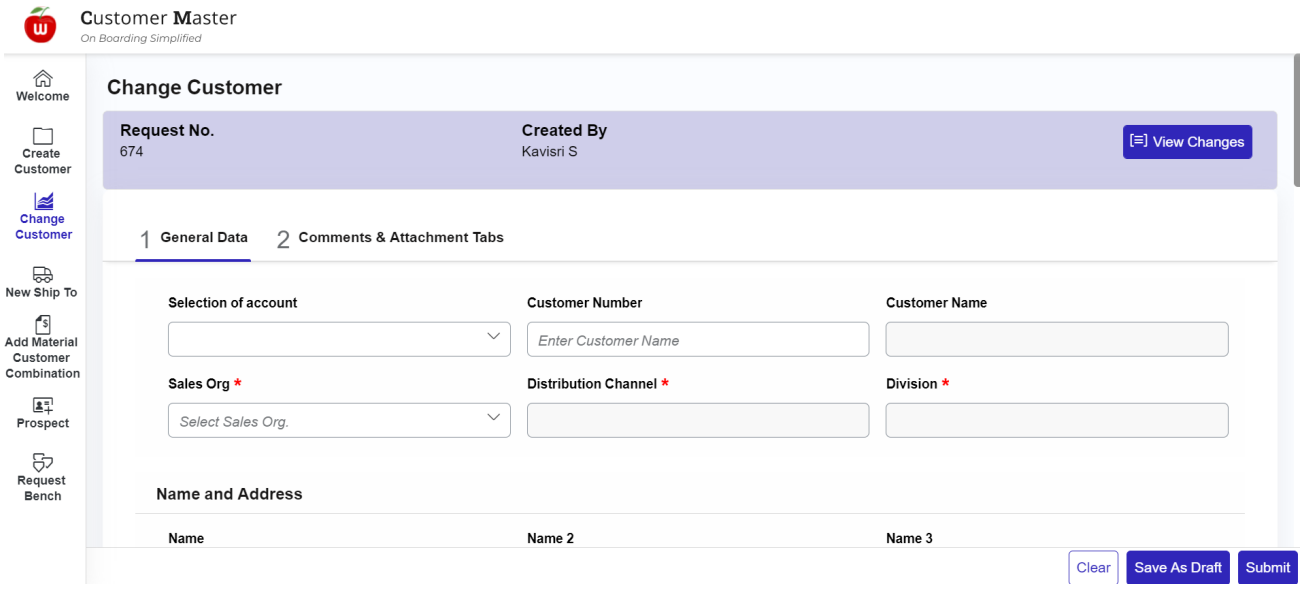


Figure 4.4: Change Customer

5. Prospect Module in Customer Creation

   User can add prospect details as a part of customer creation

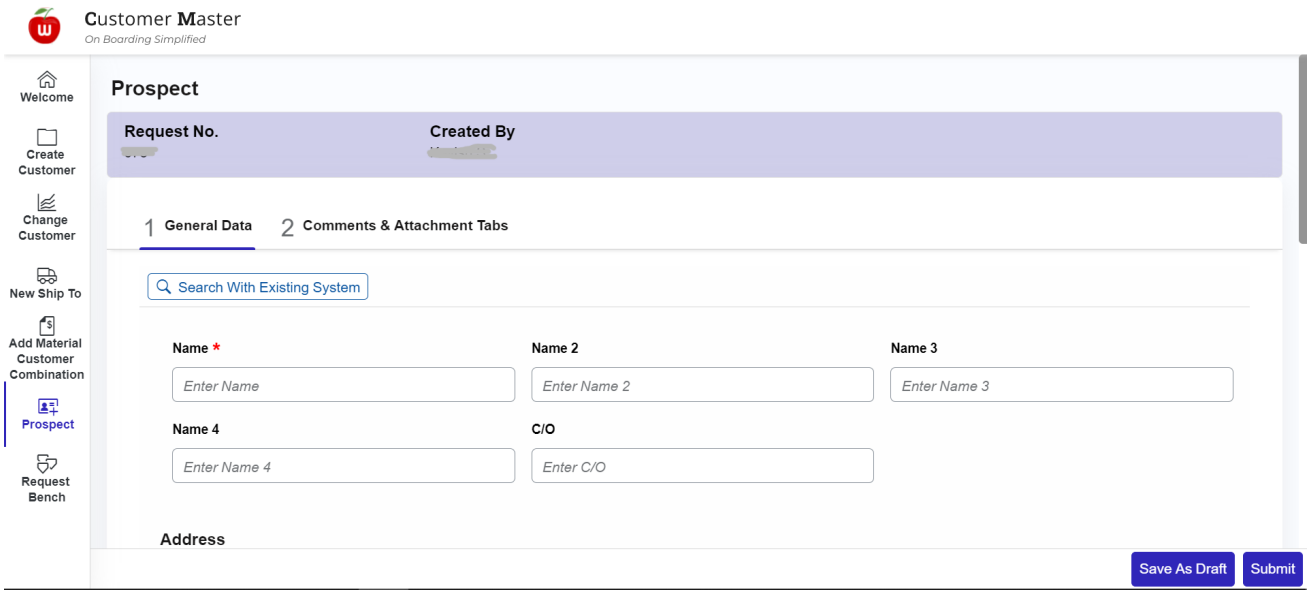


Figure 4.5: Prospect Module

6. Request Bench

   Page where user can search and filter customer data

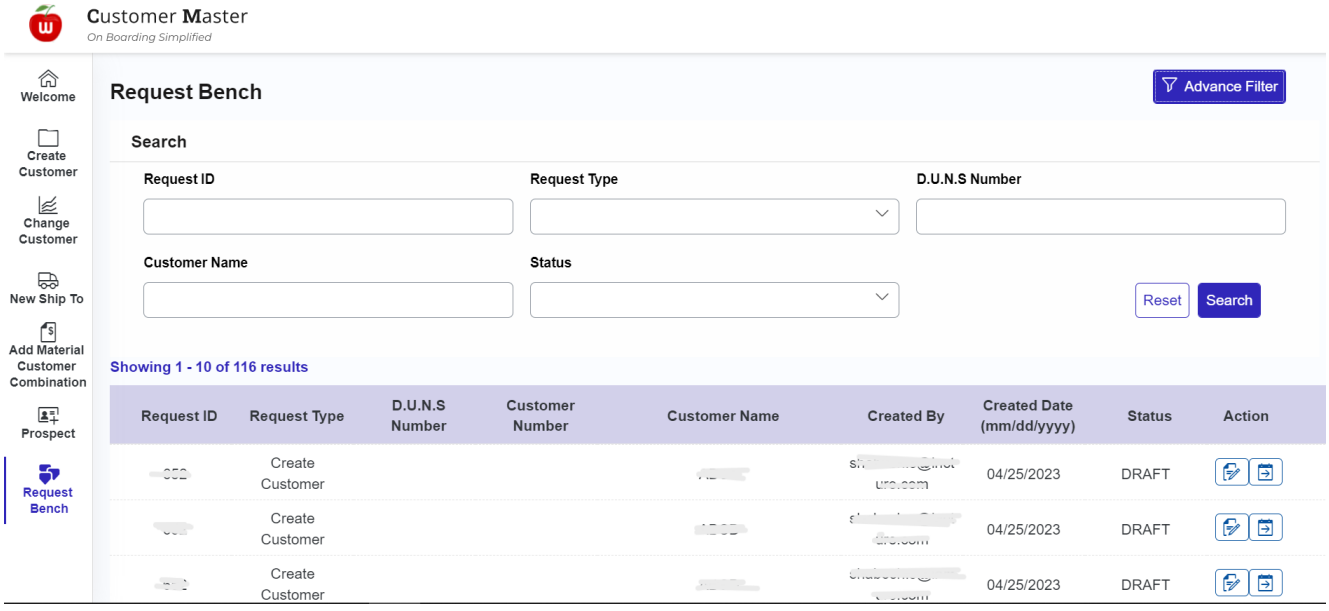


Figure 4.6: Request Bench

7. ITM Login Page

   User can login into

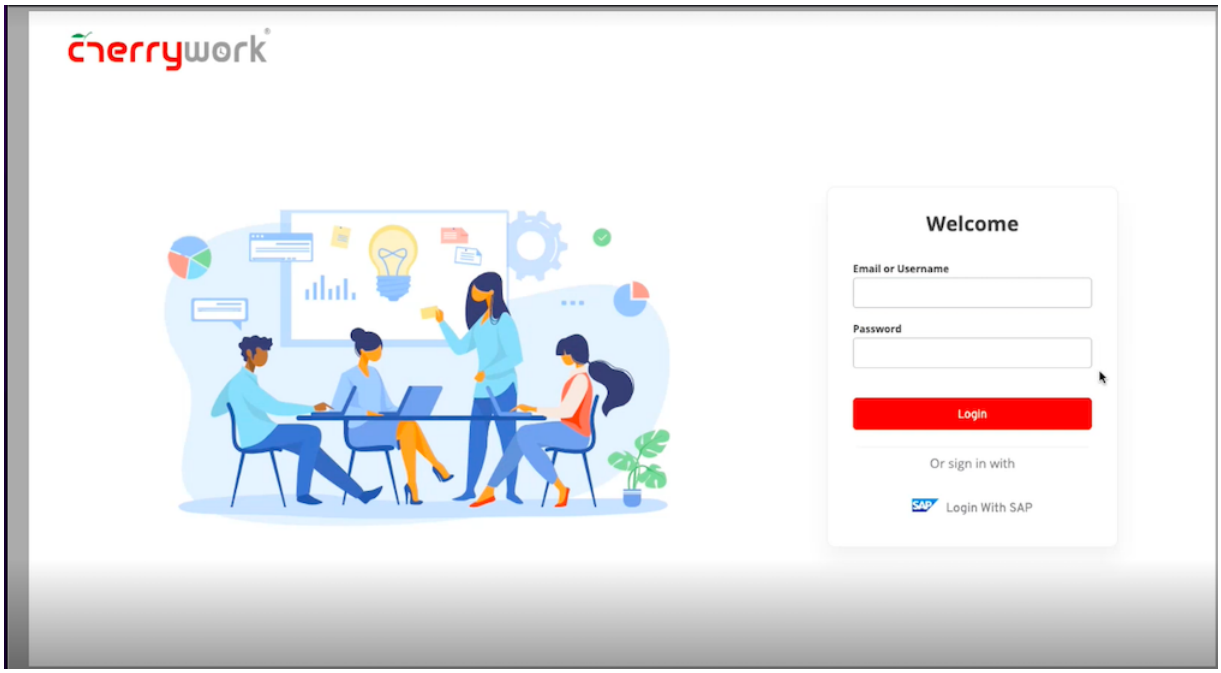


Figure 4.7: ITM Login Page

8. ITM Dashboard

   Page where user can view the ITM dashboard

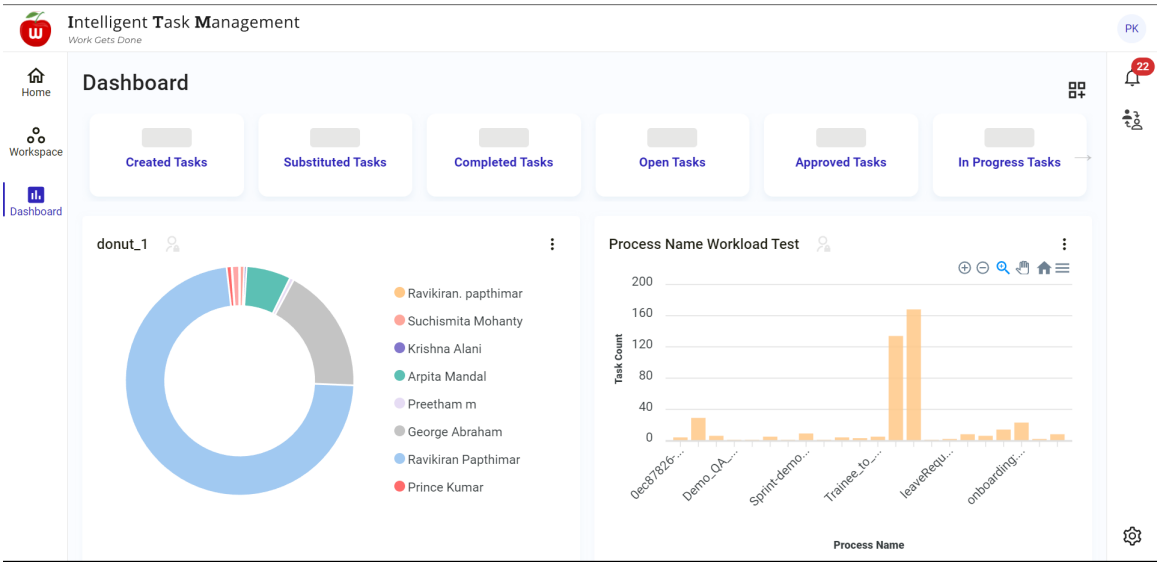


Figure 4.8: ITM Dashboard

9. ITM Workspace

Page where user can view the ITM Workspace

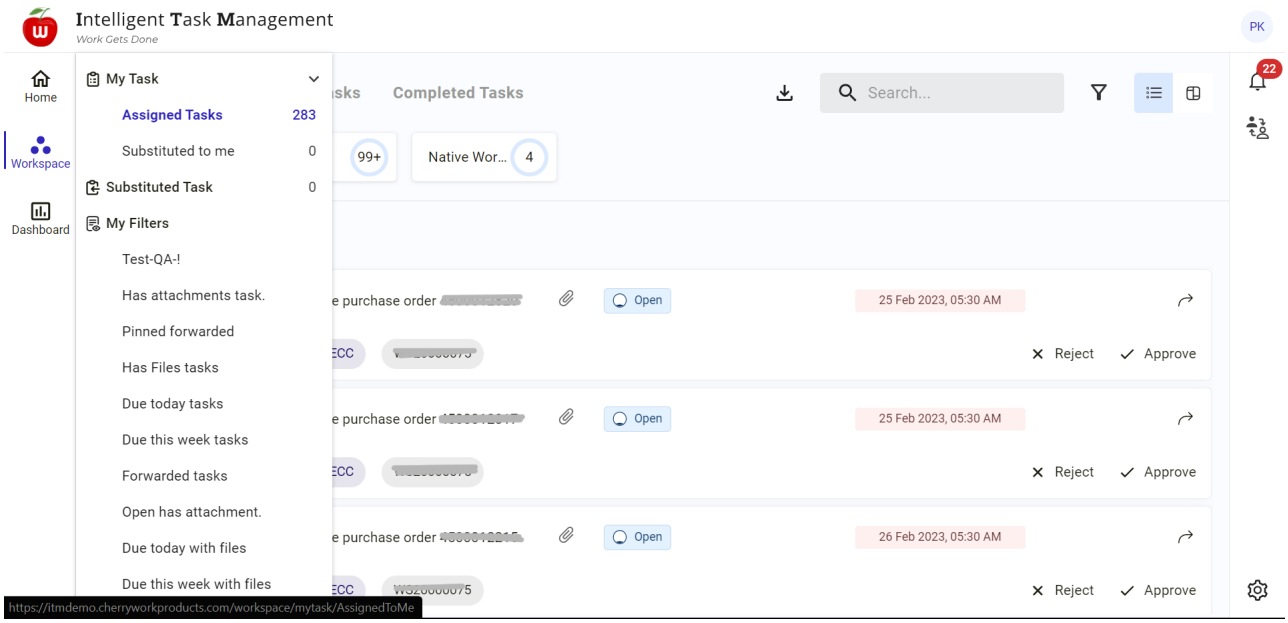


Figure 4.9: ITM Workspace

10. ITM Assigned Task

Page where user can view the ITM Assigned Task

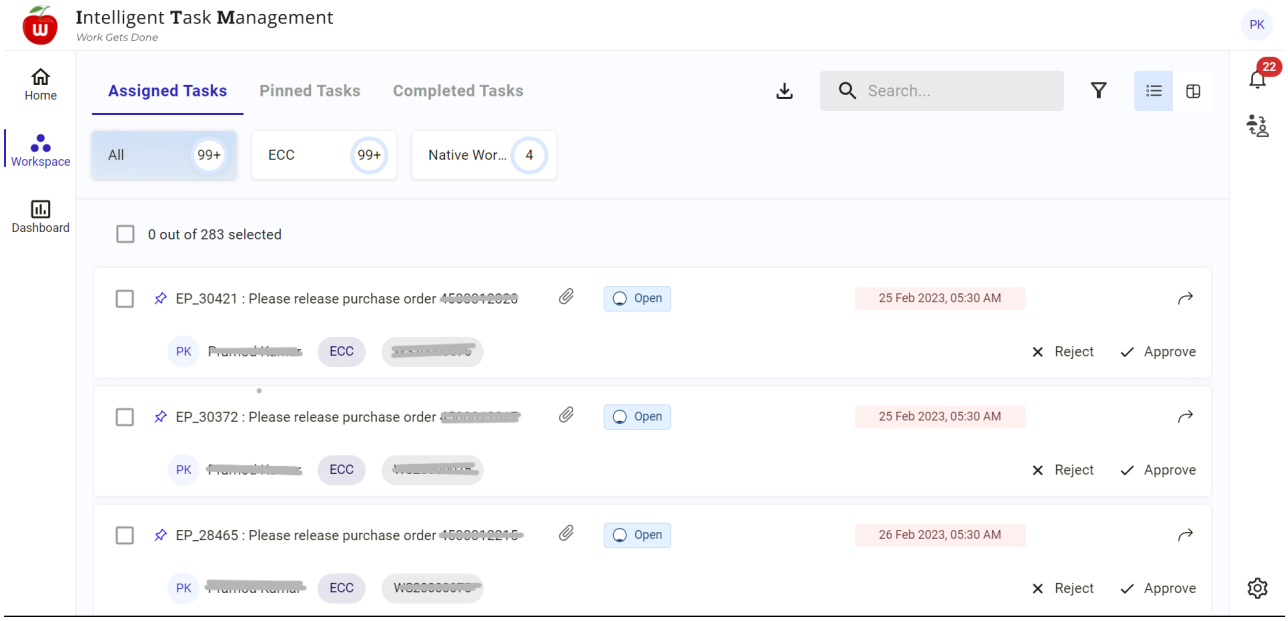


Figure 4.10: ITM Assigned Task

# Chapter 5

# Conclusion

In conclusion, **CUSTOMER MASTER DATA MANAGEMENT** is a Spring Boot application that manages customer data with a workflow and set of rules for approvals. It allows officials to approve customer requests as per the rules of approvals, and customer data flows in a hierarchical way. The application sends confirmation emails at each stage of approvals, and officials provide reasons for approving/rejecting and updating properties. The application stores the details of approved/non-approved customer data in a database for easy management. By implementing this application, customer data can be managed wisely, and the requirements of each customer can be fulfilled accordingly. The application is built on SAP and Java, and the conversion to S4/HANA allows for customization of customer data and prioritization of data. Overall, the application streamlines the customer data management process, making it easier to maintain, search, and filter data, and ensuring a proper workflow for approvals.

## 5.1 Future Enhancement

One potential future enhancement for CUSTOMER MASTER DATA MANAGEMENT could be the integration of artificial intelligence (AI) and machine learning (ML) technologies. These technologies could be used to analyze customer data and provide insights to businesses on how to better serve their customers. For example, the application could use AI algorithms to identify patterns in customer behavior, preferences, and needs. This information could then be used by businesses to personalize their marketing strategies and improve customer engagement.

Another potential enhancement could be the implementation of a customer portal, which would allow customers to view and manage their own data in real-time. This would not only provide customers with more control over their data, but it would also reduce the workload for customer service teams by allowing customers to self-serve.

Additionally, the application could be enhanced to include more detailed reporting and analytics capabilities, providing businesses with deeper insights into their customer data.

This could help businesses identify trends, track key performance indicators, and make more informed decisions about their customer management strategies.

Finally, the application could be expanded to include additional features for managing other types of master data, such as product data or vendor data. This would provide businesses with a more comprehensive solution for managing their data, further streamlining their operations and improving their overall efficiency.

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# Appendix

## Screenshots

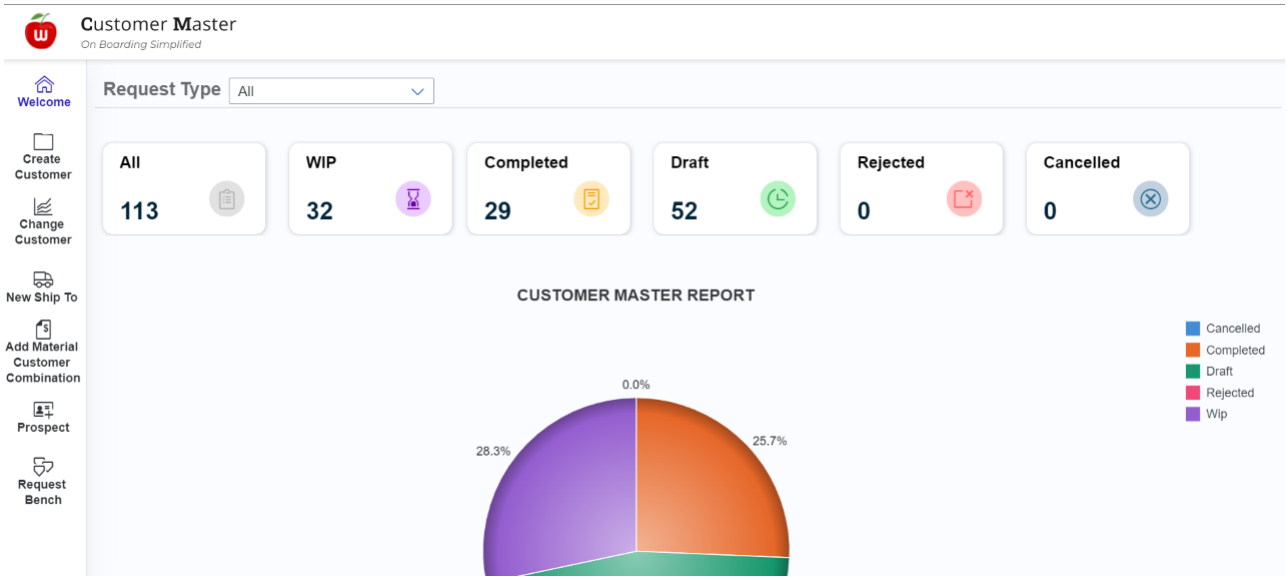


Figure A.1: Dashboard

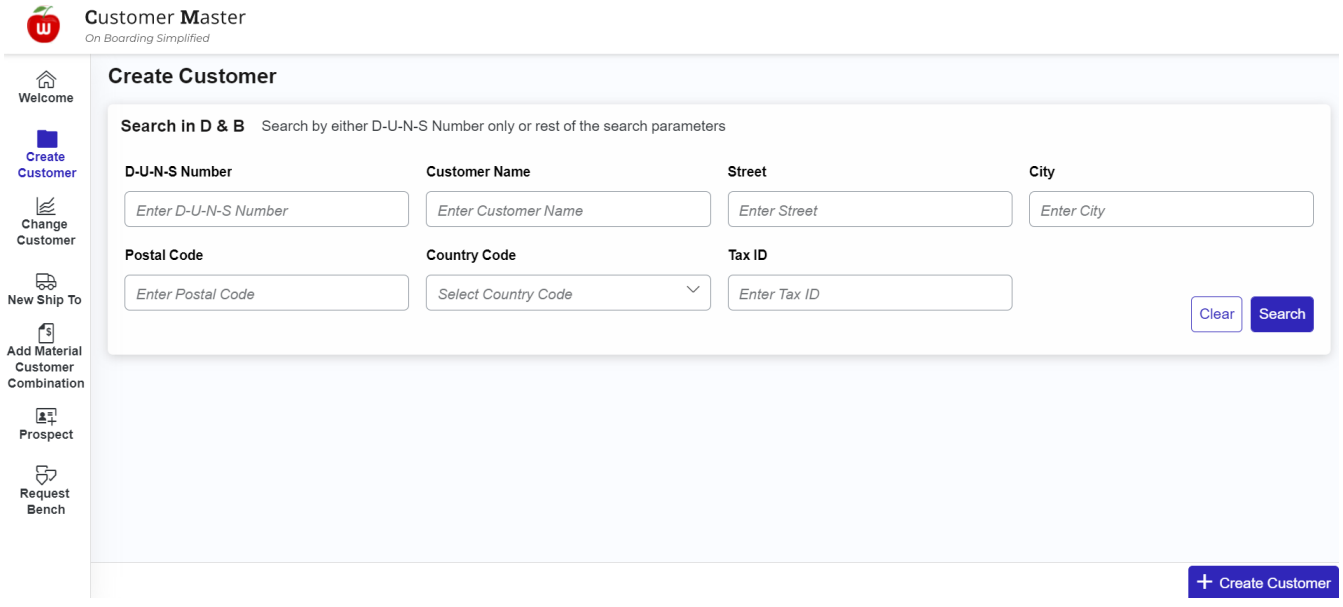


Figure A.2: Partial Completed Customer Creation

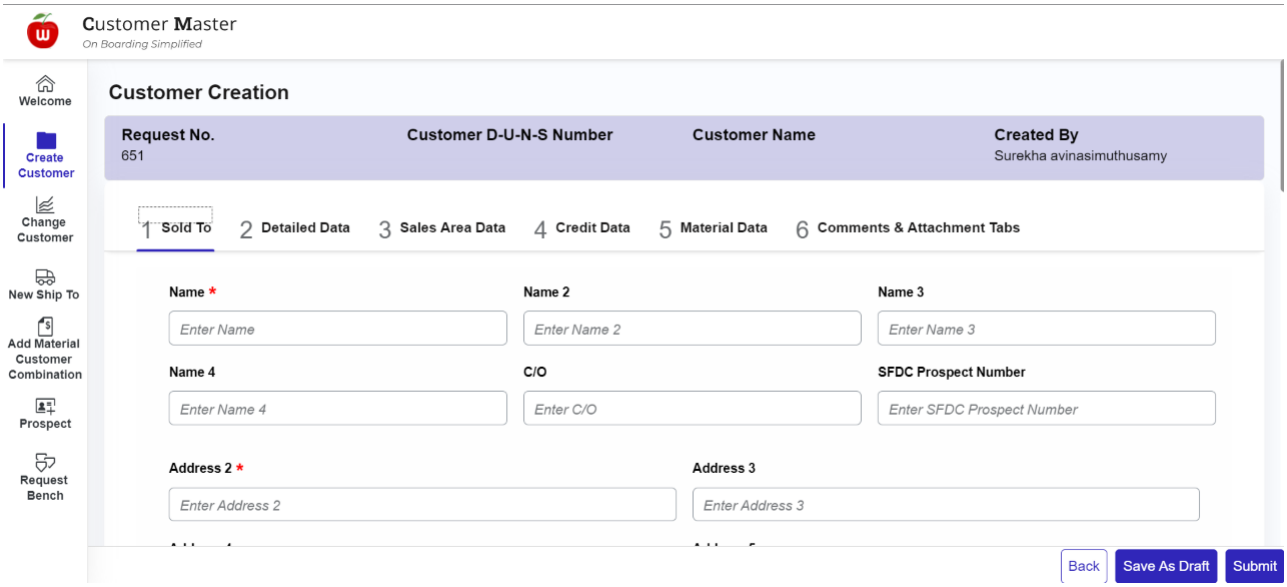


Figure A.3: Customer Creation

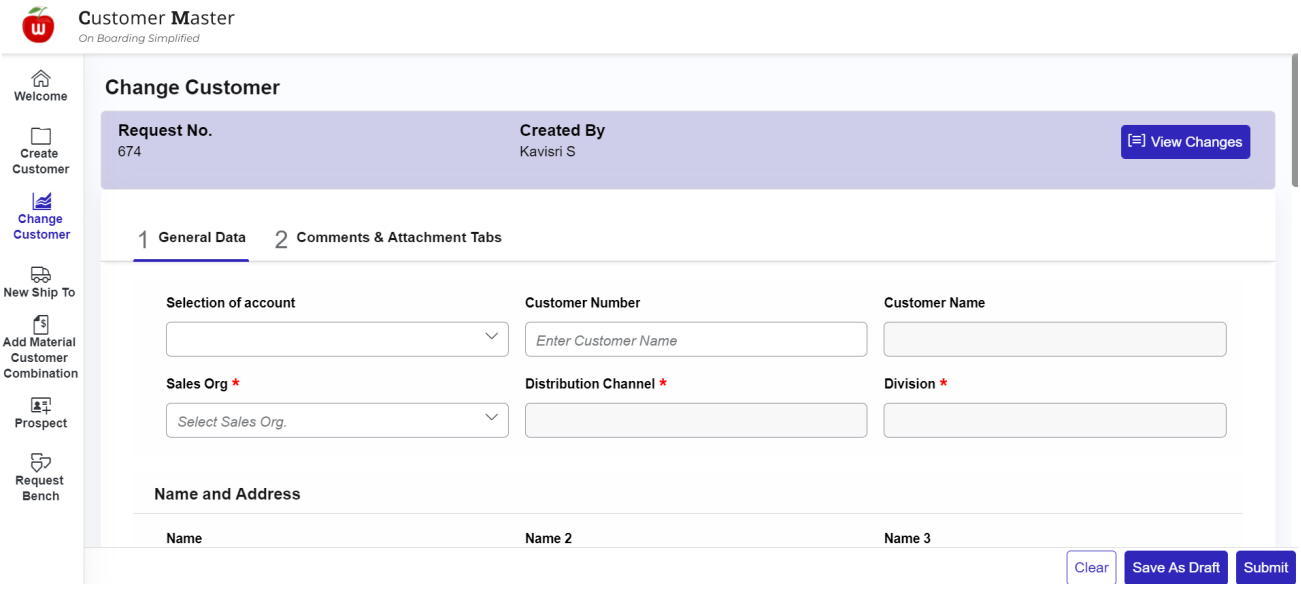


Figure A.4: Change Customer

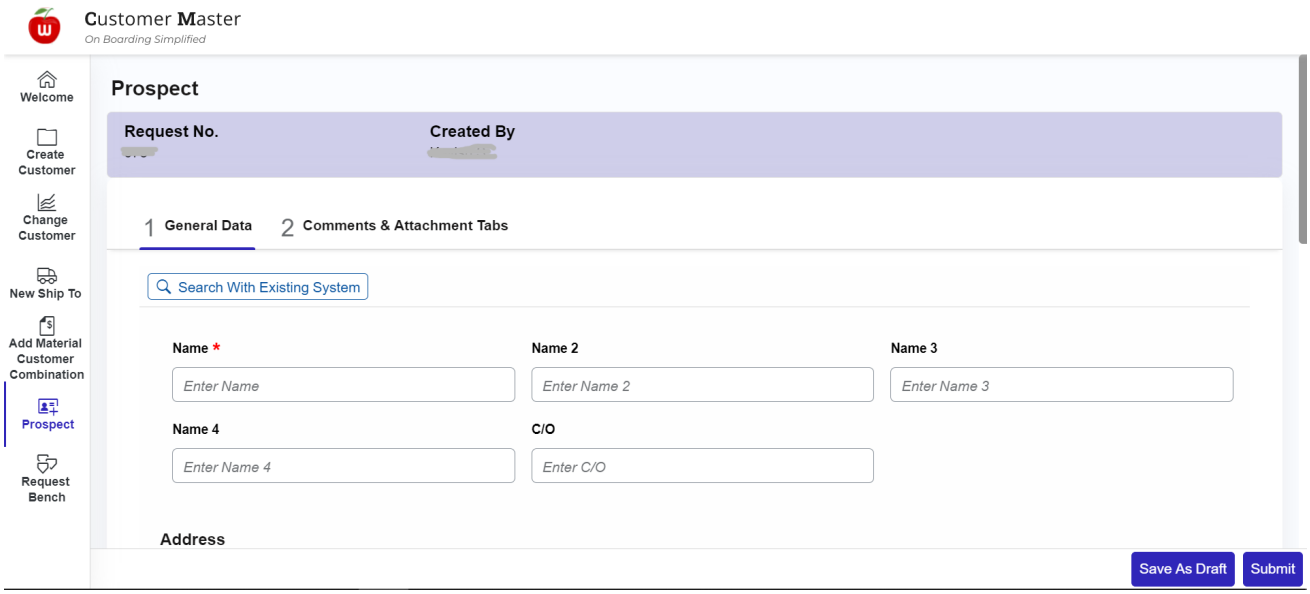


Figure A.5: Prospect Module

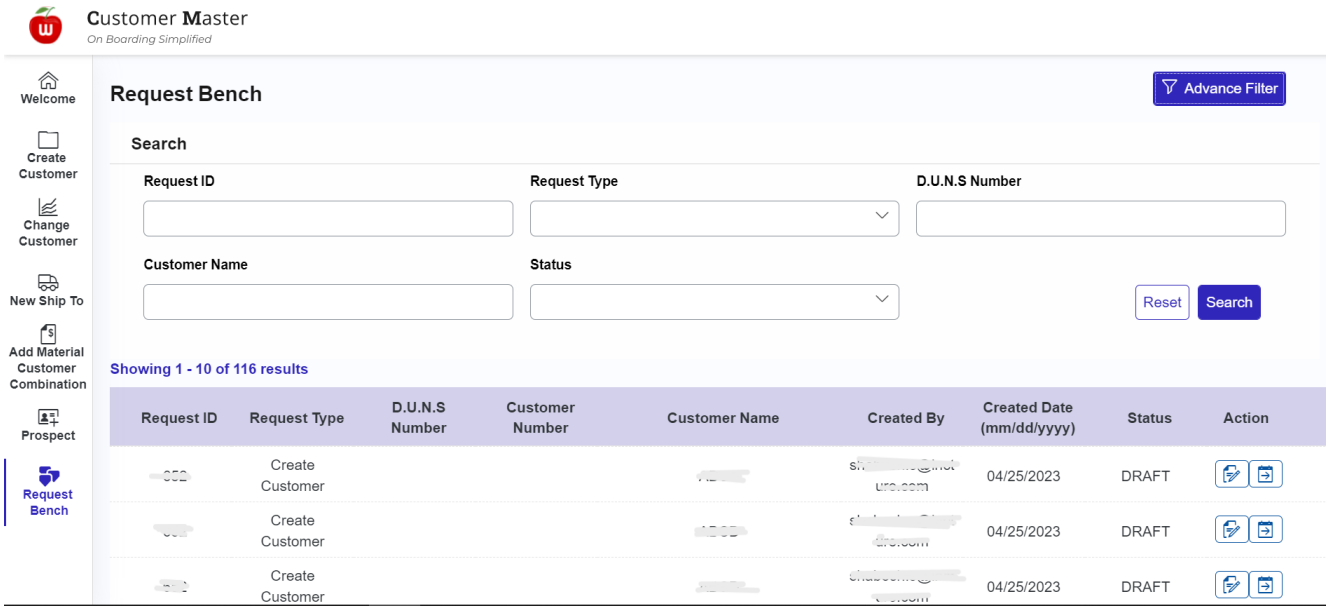


Figure A.6: Request Bench

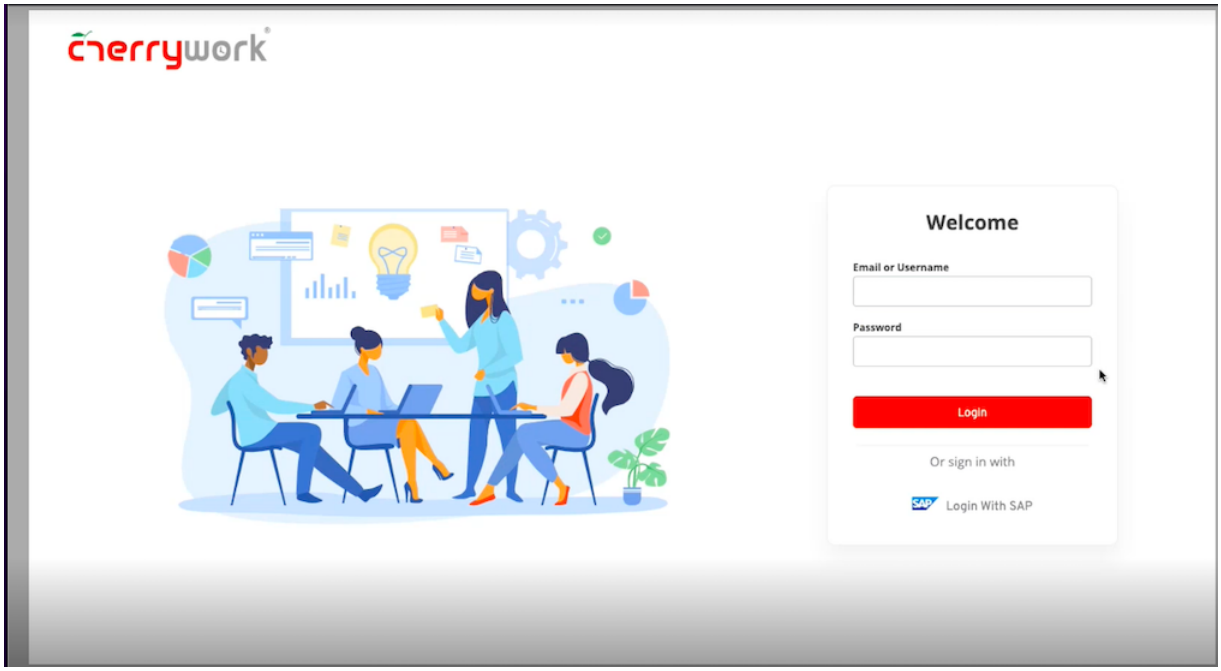


Figure A.7: ITM Login Page

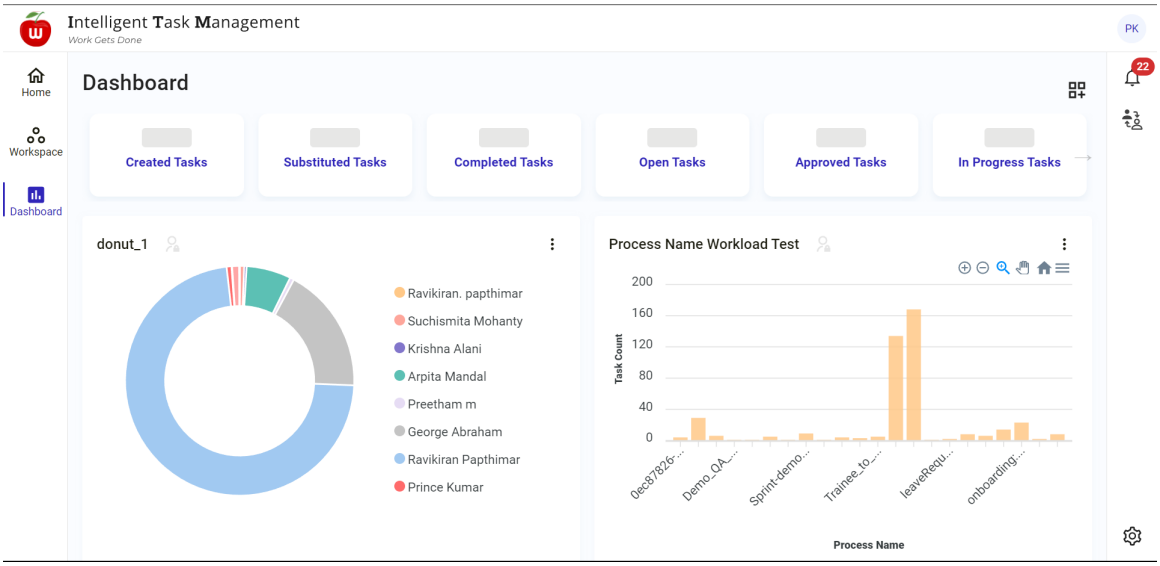


Figure A.8: ITM Dashboard

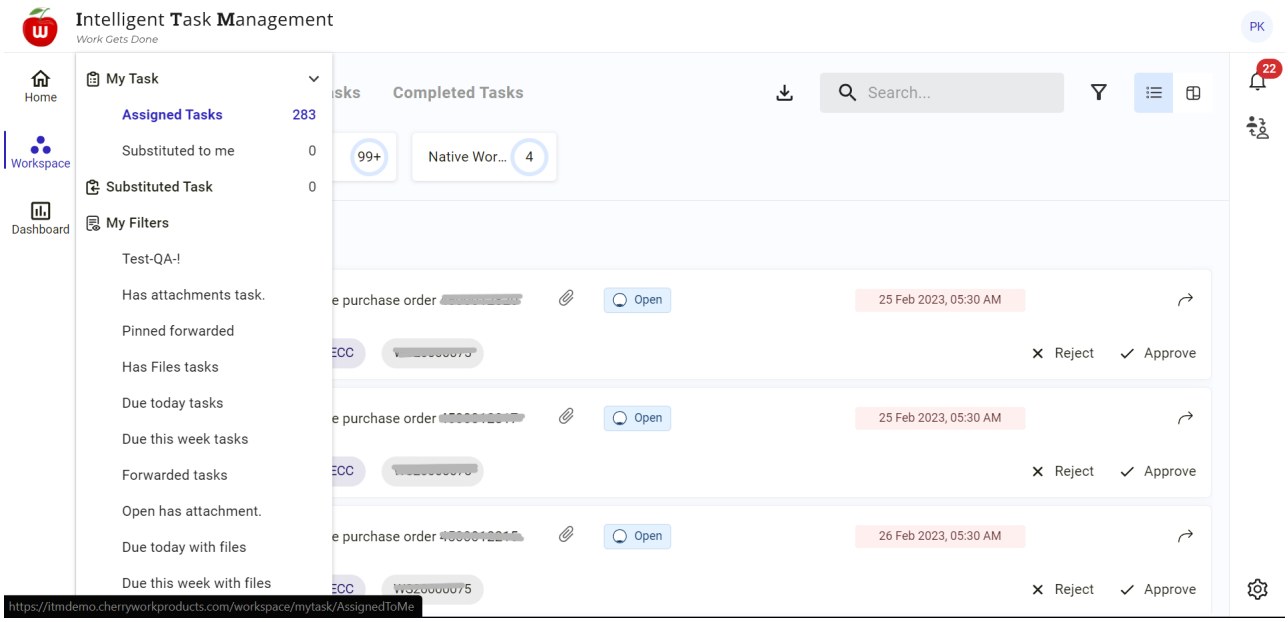


Figure A.9: ITM Workspace

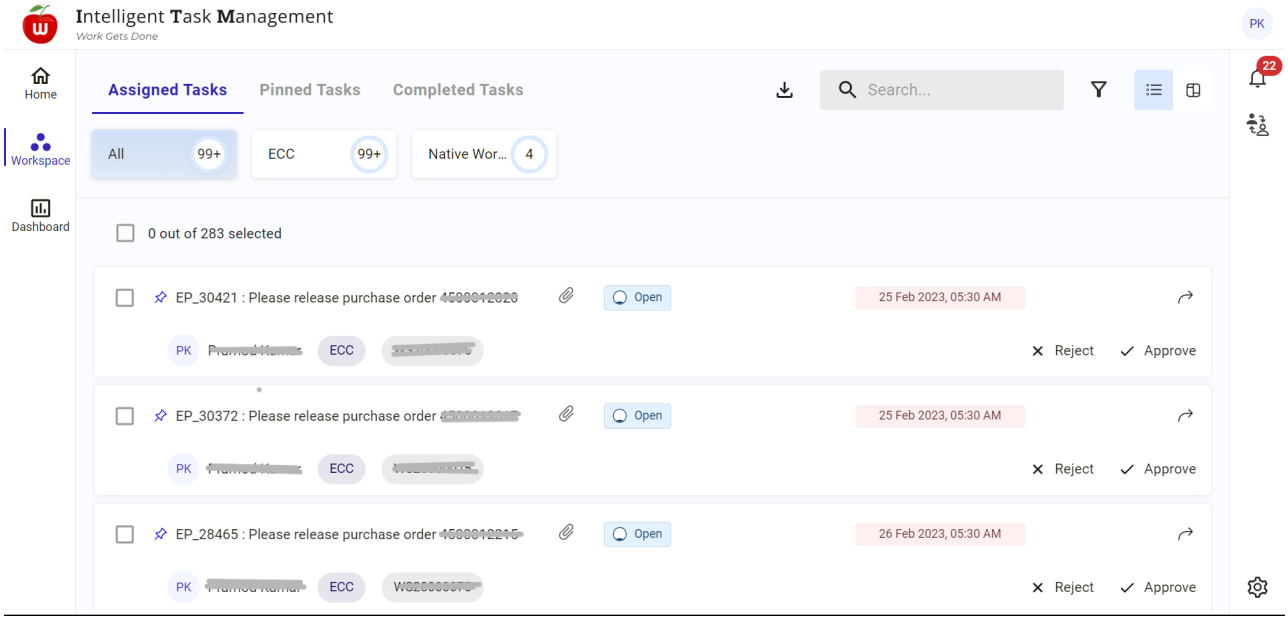


Figure A.10: ITM Assigned Task