A CRM APPLICATION FOR WHOLESALE RICE MILL

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Project Overview

The *CRM Application for Wholesale Rice Mill* is a comprehensive solution designed to address the challenges of monitoring daily rice production, sales, and reporting in a rice mill factory. The primary objective is to streamline operations and improve overall efficiency by leveraging Salesforce-based customer relationship management (CRM) functionalities. This project focuses on providing a user-friendly application that empowers the owners with clear insights into daily operations, enhancing decision-making and resource management.

The application delivers detailed **reporting and dashboards** to track key metrics such as the quantity of rice produced and sold daily, revenue generation, and customer purchase patterns. These reports are designed for easy interpretation, allowing owners to make data-driven decisions for resource allocation and future planning.

A notable feature of the project is the **rollup summary field**, which summarizes data from related child objects, such as the total value of rice supplied from detailed supplier records. By utilizing functions like SUM and COUNT, it simplifies tracking and reporting of aggregated data. Additionally, **cross-object formula fields** are implemented to calculate total payment amounts by multiplying the number of rice units taken by the price per kilogram, further automating financial calculations.

To ensure data accuracy, the project incorporates **validation rules** using Salesforce's ISBLANK formula. This rule checks for missing values and displays error messages to users, ensuring that essential information is entered correctly. The project also introduces **permission sets** and Organization-Wide Defaults (OWD) for managing data access. Roles are defined hierarchically: owners have visibility over employer and worker records, while employers can access only worker records. This structure ensures secure and appropriate access to sensitive data.

**Pre-requisites:**

To develop and deploy this project, the following prerequisites are necessary:

* A Salesforce Developer account.
* Basic knowledge of Salesforce admin concepts, including objects, relationships, and access controls.
* A system with two installed web browsers and stable internet connectivity.

**Key Learning Outcomes:**

Through this project, participants will gain practical experience in:

* Real-time Salesforce project development.
* Creating and managing objects and relationships.
* Implementing formula fields, validation rules, and rollup summary fields.
* Designing cross-object formula fields and page layouts.
* Generating reports and dashboards for business insights.

By combining advanced CRM functionalities with tailored reporting and role-based access, this project aims to enhance operational efficiency, improve customer experiences, and support the long-term growth of the rice mill factory.

Objectives

The *CRM Application for Wholesale Rice Mill* is designed to achieve specific, measurable goals that address operational challenges and deliver business value. The objectives of the project are as follows:

1. **Business Goals**:
   * To streamline and optimize daily operations by automating rice production and sales tracking.
   * To improve decision-making through comprehensive and accurate reporting of key business metrics.
   * To enhance operational efficiency by centralizing data and simplifying resource allocation for owners.
   * To provide secure and role-based access to ensure data confidentiality and integrity across different user roles (owners, employers, and workers).
2. **Specific Outcomes**:
   * Development of a user-friendly CRM application that generates detailed daily reports on rice production, sales, and revenue.
   * Implementation of **rollup summary fields** to aggregate data, such as total rice supplied from suppliers.
   * Integration of **cross-object formula fields** to automate payment calculations based on the number of rice units and price per kilogram.
   * Creation of **validation rules** to ensure data accuracy and completeness, reducing errors during data entry.
   * Configuration of **permission sets** and roles to control access, ensuring owners have full visibility while restricting access for employers and workers.
   * Delivery of visually informative **dashboards and reports** to monitor key metrics like daily revenue, popular rice types, and frequent customers.

These objectives collectively aim to enhance the rice mill's operational performance, support informed decision-making, and achieve long-term business growth through improved efficiency and data-driven insights.

Salesforce Key Features and Concepts Utilized

The *CRM Application for Wholesale Rice Mill* leverages core Salesforce functionalities and concepts to deliver an efficient and robust solution. The key features and concepts utilized in the project include:

1. **Objects and Relationships**:
   * Creation of custom objects to store rice production details, sales records, and supplier information.
   * Establishment of relationships (Master-Detail and Lookup) to link objects for efficient data organization and retrieval.
2. **Rollup Summary Fields**:
   * Used to summarize data from child records to parent objects in a Master-Detail relationship.
   * Example: Aggregating the total quantity of rice supplied from related supplier records using SUM and COUNT functions.
3. **Cross-Object Formula Fields**:
   * Implemented to perform calculations by referencing fields from related objects.
   * Example: Calculating the total payment amount as Number of Rice Units × Price per Kilogram.
4. **Validation Rules**:
   * Ensures data accuracy and completeness by validating inputs with ISBLANK and other logical formulas.
   * Displays error messages when mandatory fields are left blank or invalid data is entered.
5. **Reports and Dashboards**:
   * Generation of daily and detailed reports on rice production, sales revenue, and popular rice types.
   * Creation of visually intuitive dashboards for owners to analyze key metrics and trends.
6. **Permission Sets and Organization-Wide Defaults (OWD)**:
   * Configuration of role-based access controls to ensure secure data visibility.
   * Example: Owners can access employer and worker records, while employers are restricted to worker-level data.
7. **Page Layouts**:
   * Customization of page layouts to enhance user experience by displaying relevant fields and information for different users.

By applying these Salesforce features and concepts, the project delivers a well-structured, secure, and data-driven CRM solution tailored to the unique operational needs of a rice mill factory.

Detailed Steps to Solution Design

**1. Salesforce Account Creation**

* Visit the Salesforce website and sign up for a Developer account.
* Complete the registration form with valid details.
* Verify your email and log in to your Salesforce account.

**2. Create Custom Objects**

1. **Supplier Object**
   * **Path**: Setup → Object Manager → Create → Custom Object.
   * **Fields**:
     + Label Name: Supplier
     + Plural Label: Suppliers
     + Record Name: Supplier Name (Data Type: Text)
   * **Options**: Enable "Allow Reports," "Track Field History," and "Allow Search."
   * **Save**.
2. **Rice Mill Object**
   * Label Name: Rice Mill
   * Plural Label: Rice Mills
   * Record Name: Auto-Number
     + Display Format: rice-{000}
     + Starting Number: 1
   * Enable reporting, field history tracking, and search.
   * **Save**.
3. **Consumer Object**
   * Label Name: Consumer
   * Plural Label: Consumers
   * Record Name: Auto-Number
     + Display Format: consumers-{000}
     + Starting Number: 1
   * Enable reporting and search.
4. **Rice Details Object**
   * Label Name: Rice Details
   * Plural Label: Rice Details
   * Record Name: Auto-Number
     + Display Format: rice-{000}
     + Starting Number: 1
   * Enable reporting and search.

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**3. Create Tabs for Objects**

* **Path**: Setup → Tabs → New (Custom Object Tab).
* Create Tabs for:
  + Supplier
  + Rice Mill
  + Consumer
  + Rice Details
* Select Tab Style → Assign to all profiles (keep default settings).
* Save.

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**4. Create Lightning App Page**

* **Path**: Setup → App Manager → New Lightning App.
* **Steps**:
  + App Name: MY RICE
  + Upload a relevant logo.
  + Add Navigation Items: Supplier, Rice Mill, Consumer, Rice Details.
  + Assign User Profiles: System Administrator.
* Save.

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**5. Create Custom Fields**

1. **Rice Details Object**:
   * Number Field:
     + Label: Rice Distributed
     + Data Type: Number (Length: 5).
2. **Rice Mill Object**:
   * Number Field:
     + Label: Rice Price/Kg
     + Data Type: Number (Length: 5).
3. **Consumer Object**:
   * Fields:
     + First Name (Text)
     + Last Name (Text)
     + Phone Number (Phone)
     + Email (Email)
     + Rice Taken by Shops (Number, Length: 5)
     + Rice Type (Picklist: Basmati, Normal Rice)
     + Mode of Payment (Picklist: Credit Card, Debit Card, Net Banking, UPI, Cash).

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**6. Create Relationships**

1. **Junction Object** (Rice Details):
   * **Master-Detail Relationships**:
     + Related Objects: Supplier, Rice Mill.
     + Field Labels: Supplier Name, Rice Mill Name.
2. **Master-Detail Relationship**:
   * Object: Consumer → Related Object: Rice Mill.
   * Field Label: Rice Mill Name.

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**7. Create Roll-Up Summary Fields**

* **Supplier Object**:
  + Roll-Up Type: SUM
  + Aggregated Field: Rice Distributed (from Rice Details).
  + Field Label: Sum of Rice Distributed.
* **Rice Mill Object**:
  + Similar steps with Field Label: Rice Distributed to Shops.
* **Consumer Object**:
  + Roll-Up Type: SUM
  + Aggregated Field: Rice Taken by Shops.

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**8. Create Cross-Object Formula Fields**

1. **Amount Paid**:
   * Object: Consumer
   * Data Type: Formula (Return Type: Number).
   * Formula:

*rice\_taken\_by\_shops\_\_c \* rice\_mill\_name\_\_r.rice\_price\_kg\_\_c*

1. **Consumer Name**:
   * Formula: *First\_Name\_\_c + ' ' + Last\_Name\_\_c*

**9. Create Validation Rules**

* Object: Consumer
* Rule Name: PhoneOrEmailBlankRule.
* Description: Phone Number and Email must not be blank.
* Formula: *OR(ISBLANK(phone\_number\_\_c), ISBLANK(email\_\_c))*
* Error Message: "Please fill in your phone number."
* Error Location: Top of Page.

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**10. Create Profiles**

1. **Owner Profile**:
   * Clone Standard User → Name: Owner.
   * Grant permissions for all objects.
2. **Employer Profile**:
   * Clone Standard Platform User → Name: Employer.
   * Set default app and permissions for required objects.
3. **Worker Profile**:
   * Clone Standard Platform User → Name: Worker.
   * Set permissions accordingly.

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**11. Create Roles**

* Path: Setup → Roles → Set Up Roles.
* Create Roles:
  + Owner (Under CEO)
  + Employer (Under Owner)
  + Worker (Under Employer).

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**12. Create Users**

* Path: Setup → Users → New User.
* Create Users:
  1. Vicky Y (Role: Owner, Profile: Owner)
  2. Ram Ram (Role: Employer, Profile: Employer)
  3. Ragu Raj (Role: Worker, Profile: Worker).

**13. OWD Settings**

* Path: Setup → Sharing Settings.
* Update default internal access:
  + Rice Mill and Supplier: Public Read-Only.

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**14. Create Report**

* Path: Reports → New Report.
* Report Type: Rice Mill with Consumers.
* Fields:
  + Consumer Name, Rice Type, Rice Price/Kg, Mode of Payments, Amount Paid.
* Group Rows: Rice Taken by Shops.
* Save Report: Range of Amount Per Day.

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**15. Share Report**

* Subscribe to the report:
  + Run as: Another person (e.g., Owner).

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**16. Create Folders**

1. **Report Folder**: Estimated Rice Per Day.
2. **Dashboard Folder**: Amount Data Dashboard.

**17. Create Dashboard**

* Path: Dashboards → New Dashboard.
* Components:
  1. **Vertical Bar Chart**:
     + X-Axis: Rice Taken by Shops
     + Y-Axis: Sum of Amount.
  2. **Donut Chart**:
     + Sort By: Sum of Amount.
     + Title: Range of Amount Per Day.

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**18. Apex Development**

1. **Apex Class**: ConsumerRecord

*class ConsumerRecord {*

*public static void sendEmailNotification (List<consumer\_\_c> con) {*

*for(consumer\_\_c c : con) {*

*Messaging.SingleEmailMessage email = new Messaging.SingleEmailMessage();*

*email.setToAddresses(new List<String>{c.email\_\_c});*

*email.setSubject('Welcome to MY RICE');*

*email.setPlainTextBody('Welcome to MY RICE!');*

*Messaging.sendEmail(new List<Messaging.SingleEmailMessage>{email});*

*}*

*}*

*}*

1. **Apex Trigger**:
   * Trigger on Consumer object to send welcome emails when a record is created.
   * More information about its code is provided in this link: [woodwolfswee/Wholesale-Rice-Mill: Project description regarding Salesforce Internship](https://github.com/woodwolfswee/Wholesale-Rice-Mill) .

Testing and Validation

**1. Unit Testing (Apex Classes and Triggers)**

Unit testing ensures that the Apex code (classes and triggers) functions as expected and meets business logic requirements. It is performed using Apex Test Classes and the Salesforce testing framework.

**Steps for Unit Testing**

1. **Create Test Data:**
   * Use the @isTest annotation to write test classes.
   * Use Test.startTest() and Test.stopTest() to isolate test execution and measure code coverage.
   * Create sample data for objects like Supplier, Rice Mill, Consumer, and Rice Details using TestFactory methods or in-line methods.
2. **Write Test Methods for Apex Classes:**
   * Test all positive, negative, and edge-case scenarios.
   * Verify that the **ConsumerRecord** class sends an email to valid email addresses.
   * Use System.assertEquals and System.assertNotEquals to verify expected outcomes.

**Example: Test for ConsumerRecord Class**

*@isTest*

*private class ConsumerRecordTest {*

*@isTest*

*static void testSendEmailNotification() {*

*// Test data setup*

*Consumer\_\_c con = new Consumer\_\_c(*

*First\_Name\_\_c = 'John',*

*Last\_Name\_\_c = 'Doe',*

*Email\_\_c = 'test@example.com'*

*);*

*insert con;*

*// Start test context*

*Test.startTest();*

*ConsumerRecord.sendEmailNotification([con]);*

*Test.stopTest();*

*// Verify Email Sent*

*List<Messaging.SingleEmailMessage> emails = Limits.getEmailInvocations();*

*System.assertEquals(1, emails.size(), 'One email should be sent');*

*}*

*}*

1. **Write Test Methods for Apex Triggers:**
   * Test both **before** and **after** triggers.
   * Ensure triggers execute correctly for insert, update, and delete events.
   * Simulate edge cases like inserting duplicate records or null fields.

**Example: Test for Consumer Trigger**

*@isTest*

*private class ConsumerTriggerTest {*

*@isTest*

*static void testTriggerLogic() {*

*// Create test consumer data*

*Consumer\_\_c con = new Consumer\_\_c(*

*First\_Name\_\_c = 'Jane',*

*Last\_Name\_\_c = 'Smith',*

*Email\_\_c = 'jane.smith@example.com'*

*);*

*insert con;*

*// Verify logic execution*

*System.assertNotEquals(null, con.Id, 'Consumer record should be inserted successfully.');*

*}*

*}*

1. **Achieve Code Coverage:**
   * Ensure code coverage for all Apex classes and triggers is at least **75%** (Salesforce minimum requirement).
   * Test all branches of if-else conditions and loops.
2. **Bulk Testing:**
   * Test the code’s performance for bulk inserts, updates, and deletions using up to 200 records.
   * Verify that triggers and classes handle bulk data without hitting governor limits.

**2. User Interface (UI) Testing**

User Interface Testing ensures that all the UI components (Tabs, Pages, Reports, Dashboards, and Validation Rules) are functioning correctly and provide the intended user experience.

**Steps for User Interface Testing**

1. **Navigation Testing:**
   * Verify that all navigation paths, including tabs for Supplier, Rice Mill, Consumer, and Rice Details, are accessible.
   * Ensure the Lightning App and components display correctly.
   * Validate that clicking on related records navigates to the correct details page.
2. **Object Tabs and Field Validation:**
   * Verify that fields (e.g., text, picklist, number, formula) are present and behave as expected.
   * Ensure validation rules (e.g., phone number/email fields cannot be blank) trigger error messages appropriately.
   * Test error messages for accuracy and usability.
3. **Reports and Dashboards:**
   * Verify that created reports display the expected data (e.g., "Range of Amount Per Day").
   * Ensure proper grouping, sorting, and filtering of data fields in reports.
   * Validate dashboards for visual accuracy:
     + Test charts (e.g., vertical bar chart and donut chart) for correct **X-axis** and **Y-axis** values.
     + Ensure reports are embedded correctly in dashboards.
4. **User Role and Profile Testing:**
   * Verify access permissions for different users:
     + **Owner Role:** Can see Employer and Worker records.
     + **Employer Role:** Can see Worker records.
     + Ensure other roles have restricted access as per **OWD settings** (e.g., public read-only).
   * Log in as different users (Owner, Employer, Worker) to test profile and role-based access controls.
5. **Email Functionality Testing:**
   * Validate that the ConsumerRecord Apex class sends the correct email notification.
   * Verify email content (subject, body, and recipient) in test scenarios.
6. **Data Integrity Testing:**
   * Verify **Master-Detail** relationships (e.g., between Rice Mill and Consumer) function correctly.
   * Test roll-up summary fields to ensure aggregated data (e.g., "Sum of Rice Distributed") is accurate.
7. **Formulas and Cross-Object Fields:**
   * Test formula fields like Amount Paid and Consumer Name.
   * Verify calculations for correctness when dependent fields are updated.
8. **Error Handling and Validation:**
   * Test form submission with missing or invalid inputs.
   * Verify that error messages for validation rules are displayed at the correct location (e.g., top of the page).
9. **Reports and Subscriptions:**
   * Verify that the scheduled report email notifications are sent to the correct users (e.g., Owner receives the "Rice Mill Report").
   * Check that reports and dashboards are saved in the correct folders.
10. **Cross-Browser Compatibility Testing:**
    * Ensure the UI displays correctly in different browsers like Chrome, Firefox, Safari, and Edge.
    * Test responsiveness across various screen sizes and devices.

Key Scenarios Addressed by Salesforce in the Implementation Project

Salesforce addresses a variety of business use cases and scenarios to streamline processes, enhance productivity, and ensure data accuracy in the implementation project. Below are the **key scenarios** addressed:

**1. Supplier and Consumer Management**

**Scenario:**  
Managing records for suppliers, rice mills, and consumers to maintain accurate data and track transactions.

**Salesforce Solution:**

* Custom Objects like **Supplier**, **Rice Mill**, and **Consumer** are created to store and manage data.
* Relationships are established (e.g., Supplier related to Rice Mills, Consumers linked to Rice Mills) using **Master-Detail** or **Lookup Relationships**.
* **Validation Rules** ensure data integrity, such as validating correct email formats for consumers.

**2. Automated Email Notifications**

**Scenario:**  
Consumers need to be notified via email when their records are created or updated.

**Salesforce Solution:**

* An **Apex Class** is implemented (ConsumerRecord) to send **email notifications** to consumers when their data is added or modified.
* Custom logic ensures that only valid email addresses trigger the email notifications.
* This enhances communication efficiency with external stakeholders.

**3. Bulk Data Processing and Trigger Logic**

**Scenario:**  
Processing a large number of records for consumers, rice mills, and suppliers without performance bottlenecks.

**Salesforce Solution:**

* **Apex Triggers** are implemented with bulkification principles to handle bulk record operations like insert, update, and delete efficiently.
* Bulk testing ensures triggers comply with Salesforce governor limits.
* **System.assertEquals** statements validate trigger outcomes in unit tests.

**4. Role-Based Access Control (Security)**

**Scenario:**  
Different users (Owner, Employer, and Worker roles) need controlled access to data based on their responsibilities.

**Salesforce Solution:**

* **Profiles** and **Roles** are created to control user access to objects and fields.
* Object-level access:
  + **Owner Role:** Access to all records.
  + **Employer Role:** Can view Worker records.
  + **Worker Role:** Restricted access to sensitive fields or records.
* **Organization-Wide Defaults (OWD)** are configured to maintain data visibility.

**5. Reporting and Dashboards**

**Scenario:**  
Generating real-time insights to track rice distribution, consumer transactions, and supplier performance.

**Salesforce Solution:**

* **Custom Reports** are created for use cases such as:
  + Tracking rice distribution (daily, monthly).
  + Monitoring consumer transactions and outstanding amounts.
* **Dashboards** with visual components (e.g., **bar charts, donut charts**) provide actionable insights.
* Scheduled report emails ensure stakeholders receive critical updates regularly.

**6. Validation of Financial Transactions**

**Scenario:**  
Ensuring accurate financial records, such as amounts paid by consumers, and calculating roll-up summary fields.

**Salesforce Solution:**

* **Validation Rules** are implemented to ensure data accuracy for financial fields.
* **Formula Fields** (e.g., Amount Paid and Outstanding Amount) dynamically calculate values based on consumer payments.
* **Roll-Up Summary Fields** aggregate data, such as the sum of rice distributed per supplier or rice mill.

**7. Streamlined User Interface (UI) Experience**

**Scenario:**  
Providing a clean and efficient UI for users to manage records, view reports, and navigate data seamlessly.

**Salesforce Solution:**

* Custom **Lightning App Pages** and tabs are created for Supplier, Rice Mill, and Consumer records.
* UI components display data in a user-friendly format.
* Dynamic forms and page layouts ensure users can quickly update or review records.

**8. Error Handling and Validation Rules**

**Scenario:**  
Ensuring that users provide valid input for critical fields (e.g., phone numbers, email addresses, and mandatory fields).

**Salesforce Solution:**

* **Validation Rules** are applied to prevent blank or invalid inputs.
* Proper error messages guide users on correcting their entries.
* Examples include:
  + Email field requiring a valid email format.
  + Phone numbers following a specific format.

**9. Scalability and Performance**

**Scenario:**  
Handling an increasing number of records and ensuring performance does not degrade over time.

**Salesforce Solution:**

* Code is optimized using bulkified **Apex triggers** and **SOQL queries**.
* Governor limits are respected to maintain system performance.
* Unit testing for bulk operations ensures scalability for up to 200 records.

**10. Real-Time Tracking and Analytics**

**Scenario:**  
Providing stakeholders with real-time insights into rice distribution trends and operational performance.

**Salesforce Solution:**

* Custom **Reports** and **Dashboards** provide real-time data analytics.
* Report charts (e.g., bar charts, pie charts) visually represent distribution patterns.
* Real-time data ensures informed decision-making for rice mills and suppliers.

**11. Data Accuracy with Relationships**

**Scenario:**  
Maintaining accurate relationships between objects like Supplier, Rice Mill, and Consumer.

**Salesforce Solution:**

* **Lookup Relationships** and **Master-Detail Relationships** ensure data consistency.
* Parent-child relationships enable roll-up summary fields for aggregated calculations.
* Data integrity is enforced through validation rules and formula fields.

CONCLUSION

The implementation of Salesforce has successfully addressed key business challenges by streamlining processes, enhancing data accuracy, and improving communication across stakeholders.

**Summary of Achievements:**

1. **Supplier and Consumer Management**:
   * Centralized management of supplier, rice mill, and consumer records with custom objects and relationships.
2. **Automation of Notifications**:
   * Automated email notifications ensure timely communication with consumers on record updates.
3. **Bulk Data Processing**:
   * Optimized Apex triggers with bulkification principles ensure efficient handling of large datasets while adhering to Salesforce governor limits.
4. **Role-Based Access Control**:
   * Configured roles, profiles, and OWD settings to ensure secure and controlled access to data for different user roles.
5. **Data Accuracy and Validation**:
   * Validation rules and formula fields ensure data integrity, including financial transactions and field-level inputs.
6. **Improved User Experience**:
   * User-friendly Lightning pages and components provide a seamless interface for managing records and workflows.
7. **Real-Time Insights**:
   * Custom reports and dashboards provide actionable insights into rice distribution, supplier performance, and consumer transactions.
8. **Scalability and Performance**:
   * Optimized code and data structures ensure system performance and scalability as data volumes grow.

The successful Salesforce implementation has provided a robust, scalable, and automated solution that meets the organization’s needs while laying the foundation for future growth and enhancements. This project has not only improved operational efficiency but also empowered users with real-time insights and seamless data management.