SYSTEM DESIGN DOCUMENT

ERP SYSTEM FOR MINI MANUFACTURING COMPANY

1. Introduction

Purpose: This document outlines the system design for an ERP system tailored to a mini manufacturing company. The system is intended to integrate various business processes to enhance operational efficiency, streamline workflows, and support informed decisionmaking.

Scope: The ERP system will include modules for Inventory Management, Production Planning and Control, Sales and Order Processing, Purchasing and Supplier Management, Finance and Accounting, Human Resources Management, and Reporting and Analytics.

2. System Architecture

2.1 Overview

The ERP system is designed using a modular architecture, allowing each module to function independently while being integrated into a unified system. The architecture follows a threetier model consisting of the Presentation Layer, Business Logic Layer, and Data Layer.

2.2 ThreeTier Architecture

Presentation Layer:

This layer handles the user interface and interaction. It is responsible for presenting data to users and capturing user input. Technologies like React.js or Angular may be used for a responsive and userfriendly interface.

Business Logic Layer:

This layer contains the core application logic. It processes user requests, performs calculations, and ensures business rules are enforced. This layer could be built using Node.js, Python (Django/Flask), or Java (Spring) depending on the company's technology stack.

Data Layer:

This layer manages data storage and retrieval. It is responsible for storing business data, including inventory, orders, financial records, and employee information. A relational database like PostgreSQL or MySQL is recommended for structured data storage, while a NoSQL database like MongoDB can be used for handling unstructured data.

3. Modules

3.1 Inventory Management

Functionality:

Track stock levels, manage inventory records, and monitor stock movements.

Generate alerts for low stock levels and track inventory replenishment.

Key Components:

- Inventory Dashboard
- Stock Ledger
- Reorder Management
- Inventory Reporting

3.2 Production Planning and Control

Functionality:

Plan production schedules and monitor production progress.

Allocate resources effectively and manage production orders.

Track workinprogress (WIP) and finished goods.

Key Components:

- Production Schedule Planner
- Resource Allocation
- Work Order Management

- Production Tracking Dashboard

3.3 Sales and Order Processing

Functionality:

Manage customer orders, process sales, and handle invoicing.

Track order status from initiation to fulfillment.

Manage customer accounts and track sales performance.

Key Components:

- Order Entry System
- Sales Pipeline Management
- Customer Relationship Management (CRM)
- Invoice Generation

3.4 Purchasing and Supplier Management

Functionality:

Manage procurement processes, including purchase orders and supplier relationships.

Track supplier performance and manage contracts.

Automate purchase order generation based on inventory levels.

Key Components:

Supplier Management Dashboard

Purchase Order System

Supplier Performance Tracking

Contract Management

3.5 Finance and Accounting

Functionality:

Oversee financial transactions, manage budgets, and generate financial reports.

Handle accounts payable and receivable, and manage the general ledger.

Support tax compliance and financial auditing.

Key Components:

- General Ledger
- Accounts Payable and Receivable
- Budgeting and Forecasting
- Financial Reporting

3.6 Human Resources Management

Functionality:

Manage employee records, payroll, attendance, and recruitment.

Track employee performance and manage benefits.

Support compliance with labor laws and regulations.

Key Components:

- Employee Management System
- Payroll Management
- Attendance Tracking
- Recruitment and Onboarding

3.7 Reporting and Analytics

Functionality:

Generate reports and analyze data across all modules to support business decisionmaking.

Provide realtime analytics and visualizations through dashboards.

Enable custom report generation and data export.

Key Components:

- KPI Dashboard
- Custom Report Generator
- Data Export Tools
- Predictive Analytics

4. Integration and Data Flow

4.1 Integration with Existing Systems

The ERP system will integrate with existing software (e.g., CRM, Accounting Software) and hardware (e.g., barcode scanners, IoT devices). APIbased integration is recommended for seamless data exchange.

4.2 Data Flow and Communication

Data will flow between modules via an internal API. The system will employ RESTful or GraphQL APIs to ensure efficient communication between the Presentation, Business Logic, and Data Layers.

4.3 Data Synchronization

Realtime data synchronization is essential for maintaining consistency across all modules. The system will use message queues or eventdriven architecture to manage data synchronization.

5. Security and Compliance

5.1 Security Measures

Implement rolebased access control (RBAC) to restrict access based on user roles.

Use encryption (e.g., AES256) to protect sensitive data at rest and in transit.

Ensure the system complies with data protection regulations (e.g., GDPR).

5.2 Backup and Recovery

Implement regular data backups and a disaster recovery plan to minimize data loss.

5.3 Audit Logging

Maintain audit logs to track user activities and changes within the system.

6. Scalability and Performance

6.1 Scalability

The system is designed to be scalable, accommodating future growth by adding new functionalities and supporting more users.

6.2 Performance Optimization

Optimize database queries, use caching mechanisms, and employ load balancing to ensure the system performs efficiently even under high loads.

7. Implementation and Deployment

7.1 Implementation Strategy

The system will be implemented in phases, starting with core modules (e.g., Inventory Management, Sales) and progressively adding others.

7.2 Deployment Environment

The system will be deployed on a cloud platform (e.g., AWS, Azure) to leverage scalability and availability features.

7.3 Training and Support

Provide user training sessions and create user manuals to ensure smooth adoption of the ERP system.

8. Conclusion

This system design document provides a comprehensive overview of the architecture, modules, and functionalities of the ERP system for a mini manufacturing company. The design emphasizes scalability, security, and integration, ensuring the system meets the company's current and future needs.