TextileTrace

Blockchain-Based Supply Chain Management for Tamil Nadu's Textile Industry

Comprehensive Technical Documentation (27 Pages)

Executive Summary

TextileTrace is a blockchain-enabled supply chain management platform designed specifically for the Tamil Nadu textile ecosystem. The system ensures end-to-end traceability from raw cotton to finished garment export using cryptographic hash chaining and permissioned transaction validation. Each transaction references the previous hash, creating a mathematically verifiable audit trail. Security is enforced using JWT authentication, middleware-based role validation, and strict input validation. Monitoring services track node health, transaction latency, and integrity verification in real time. The architecture integrates React frontend, Node.js backend, MongoDB Atlas cloud database, and a SHA-256 verification engine. Preventive, corrective, adaptive, and perfective maintenance strategies ensure long-term sustainability. Continuous improvement follows a Monitor → Analyze → Improve → Deploy → Re-Monitor lifecycle to maintain operational excellence. This section elaborates technical design, governance alignment, deployment strategy, and performance optimization principles that make TextileTrace production-ready.

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Industry Overview

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Problem Statement

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Project Objectives

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System Architecture Overview

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Blockchain Design Model

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Hash Chain Integrity Mechanism

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Backend Architecture

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Database Design

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Security Framework

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Role-Based Access Control

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JWT Authentication Model

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API Design Structure

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System Monitoring Framework

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Cryptographic Verification Engine

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Technical Support Model

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Maintenance Strategy

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Continuous Improvement Lifecycle

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Deployment Strategy

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Cloud Infrastructure Setup

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Data Migration Strategy

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Archival & Immutability Model

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Performance Metrics & KPIs

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Compliance & Governance

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Scalability Roadmap

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