PATENT BY 3SD SOLUTIONS AND SERVICES PRIVATE LIMITED

1. **PATENT NUMBER:** 03
2. **PROVISIONAL PATENT NO:** TEMP/E-1/89920/2025-KOL
3. **APPLICATION NUMBER:** 202531080339

4. PATENT REMARKS:

BLOCKCHAIN MIDDLEWARE PLATFORM FOR AUTOMATED INVOICE VALIDATION, TRANSFORMATION, AND SETTLEMENT

5. FIELD OF INVENTION:

The present invention relates to a Blockchain Middleware Platform for Automated Invoice Validation, Transformation, and Settlement. More specifically, it pertains to a layered middleware architecture that bridges ERP-generated enterprise invoices with blockchain-based smart contract engines, enabling tokenization of invoices into blockchain assets enriched with AI-powered risk scoring, compliance data, and programmable escrow mechanisms. The invention further relates to event-driven settlement workflows, automated liquidity governance, and decentralized finance (DeFi) integration, thereby facilitating secure, transparent, and efficient invoice financing and clearing operations across multi-chain blockchain environments.

6. DESCRIPTION OF PATENT:

a) The invention provides a Blockchain Middleware Platform for Automated Invoice Validation, Transformation, and Settlement, wherein a middleware broker layer bridges ERP (Enterprise Resource Planning) systems with blockchain-based smart contract engines to ingest, validate, transform, and tokenize enterprise invoices into blockchain assets such as non-fungible tokens (NFTs).

b) The middleware broker employs a layered architecture, functioning as a protocol translator that converts Web2 enterprise invoice formats into blockchain-compatible clearing instructions, thereby enabling seamless ERP–blockchain integration.

c) The system addresses inefficiencies in traditional invoice financing and settlement workflows by combining decentralized ledger technology, AI-powered financial validation, programmable escrow mechanisms, and event-driven orchestration logic.

d) In operation, ERP-generated invoices are first validated against compliance rules, KYB/AML checks, and business logic within the middleware broker. The validated invoices are then transformed into tokenized NFTs, embedding metadata such as payment history, supplier-buyer information, risk assessment scores, and regulatory compliance data.

e) AI-powered risk scoring modules and external oracles provide dynamic financial risk assessments, analysing invoice metadata, buyer credit history, industry risk trends, and contextual financial indicators. The hybrid on-chain/off-chain call backs update invoice risk scores in real time, ensuring accurate financial monitoring.

f) A smart contract engine manages the minting of risk-scored NFTs and integrates with a programmable escrow mechanism that locks and releases funds based on milestone-based triggers such as invoice due date, delivery confirmation, or dispute resolution.

g) The invention further enables automated liquidity governance by allowing tokenized invoices to be pooled, traded, or fractionally owned in decentralized finance (DeFi) marketplaces. Smart contracts transparently manage on-chain ROI pay outs for liquidity providers based on dynamic invoice risk scores.

h) The platform incorporates DAO-based governance, enabling decentralized decision-making for rule updates, dispute resolution, compliance enforcement, and marketplace management.

i) A key advantage of the invention lies in its event-driven architecture, wherein due dates, payment confirmations, delivery verifications, or disputes automatically trigger settlement flows, thereby reducing manual intervention, increasing settlement speed, and minimizing default risks.

j) The system supports multi-chain blockchain environments, making it adaptable for supply chain finance, cross-border trade, and decentralized credit markets, while ensuring regulatory compliance through embedded KYB/AML checks and transparent blockchain audit trails.

7. PATENT DIAGRAMS:

Diagram 1:

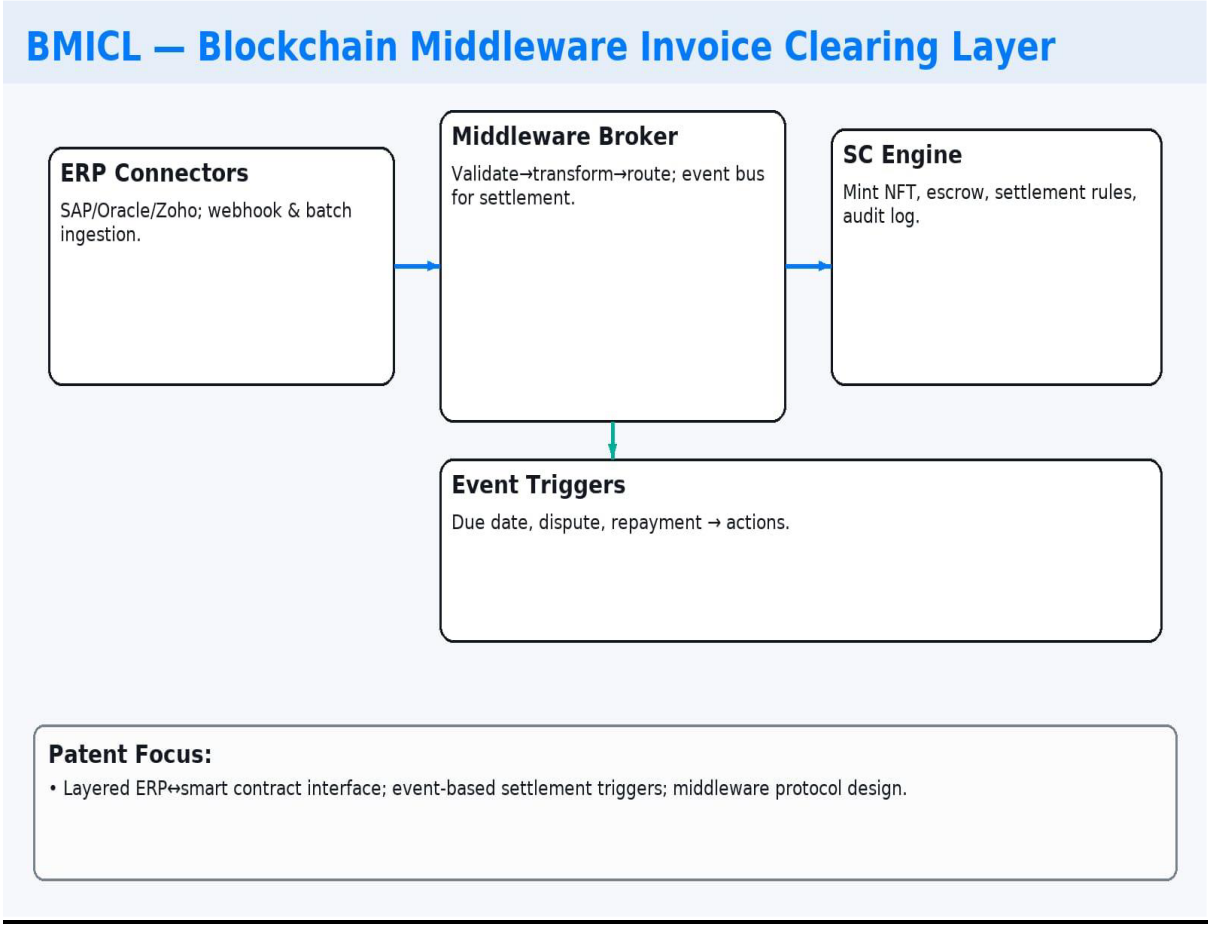
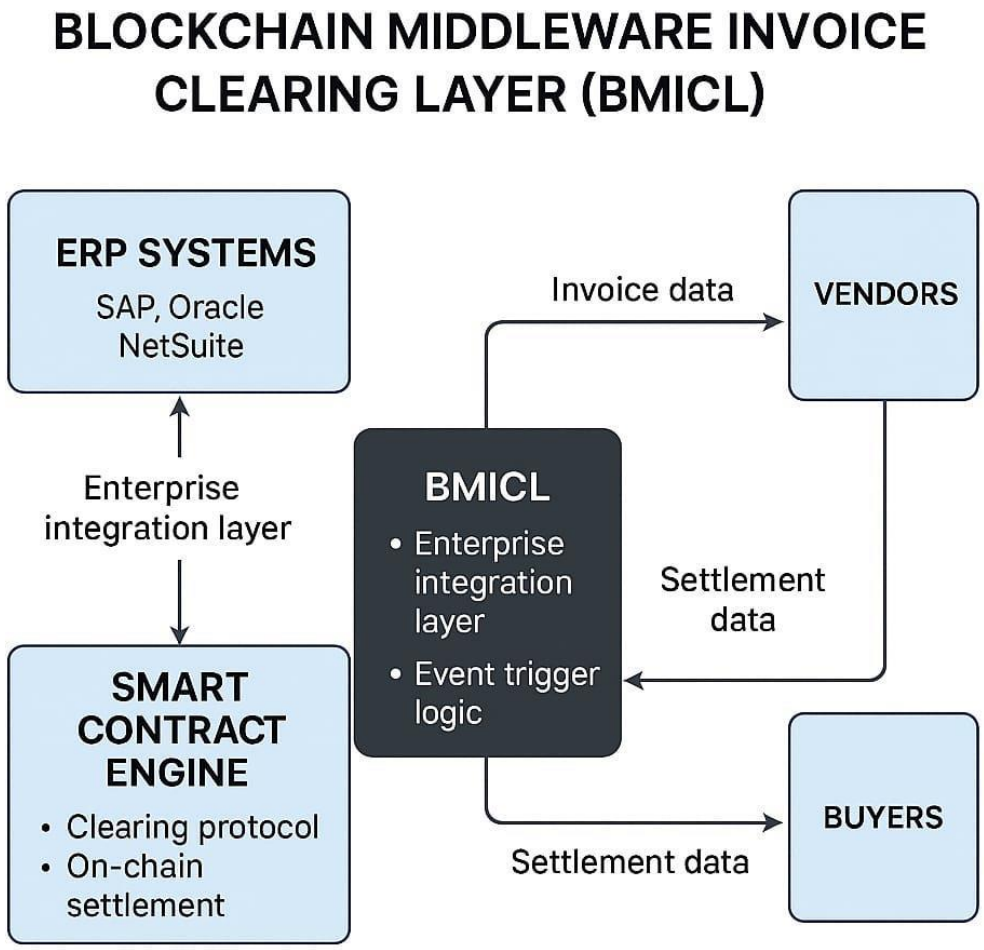


Diagram 2:


BLOCKCHAIN MIDDLEWARE INVOICE CLEARING LAYER (BMICL)
ERP SYSTEMS
SAP, Oracle NetSuite
Enterprise integration layer
SMART CONTRACT ENGINE
• Clearing protocol
• On-chain settlement
BMICL
• Enterprise integration layer
• Event trigger logic
Invoice data
VENDORS
Settlement data
Settlement data
BUYERS