



Java-Based Smart Procurement & Vendor Management System

Internship project by Dileep Kumar Yagati — a production-ready, secure, and auditable procurement platform built with Spring Boot, MySQL, JWT, and Maven.

SPRING BOOT

MYSQL

JWT



Problem Statement — Why we built this

- Manual, paper-based requisitions and approval bottlenecks slow procurement.
- Limited real-time visibility causes delays and poor decision-making.
- No centralized vendor master leads to inconsistent vendor data and risk.
- Weak budget monitoring increases financial exposure and overspend.
- Audits are time-consuming due to fragmented records and poor traceability.

These gaps create operational delays, compliance risks, and reduced accountability — prime targets for automation and modernization.

Proposed Solution — Core Concept

A centralized digital procurement platform that automates the requisition-to-PO lifecycle while providing transparency, controls, and auditability.



End-to-end Automation

Automates
Requisition →
Approval → PO
creation with
configurable
rules and
notifications.



Real-time Tracking

Live status
updates and
dashboards for
requisitions, POs,
and deliveries.



Centralized Vendor Management

Single source of
truth for vendor
data, contracts,
and performance
metrics.



Secure, Role-Based Access

JWT-based
authentication
with role and
permission
enforcement for
least-privilege
access.

Technology Stack



Backend

Spring Boot 3.2.5 (Java 17/21) — RESTful services, dependency injection, and actuator.



Reporting & Docs

Swagger (OpenAPI) for API docs; JasperReports & Apache POI for PDF/XLSX exports.



Database

MySQL 8.0 — normalized relational schema, foreign key constraints, indexed queries.



Build & CI

Maven for builds and dependency management; suitable for CI pipelines.



Security

Spring Security + JWT, BCrypt password hashing, CORS, and global exception handling.

Project Architecture — Layered Design

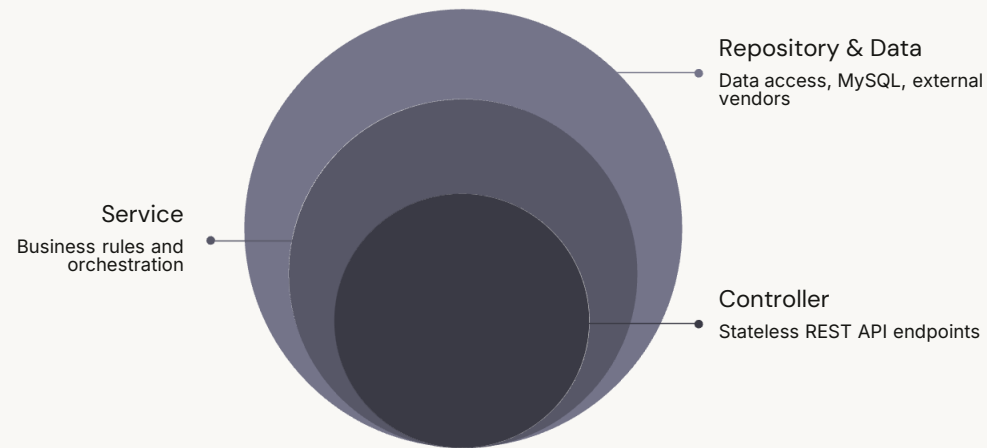


Diagram illustrates separation of concerns: Controllers (API), Services (business rules), Repositories (data access), making the system modular and testable.

Scalability

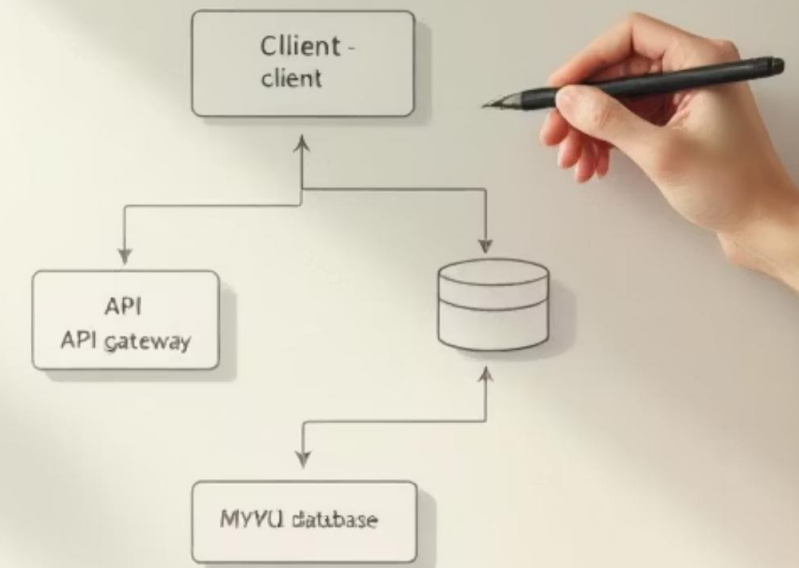
Stateless REST APIs enable horizontal scaling behind load balancers.

Maintainability

Layered codebase supports unit and integration testing, and clean CI workflows.

Extensibility

Modular modules for vendor management, reporting, and auditing simplify feature additions.



Database Design — Key Entities

Normalized relational schema with enforced referential integrity and indexes for performance.



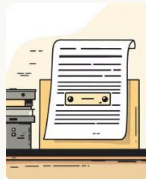
Users & Roles

Authentication, role assignments (Admin, Manager, Employee), and audit metadata.



Vendors

Vendor master with contact info, contracts, ratings, and compliance documents.



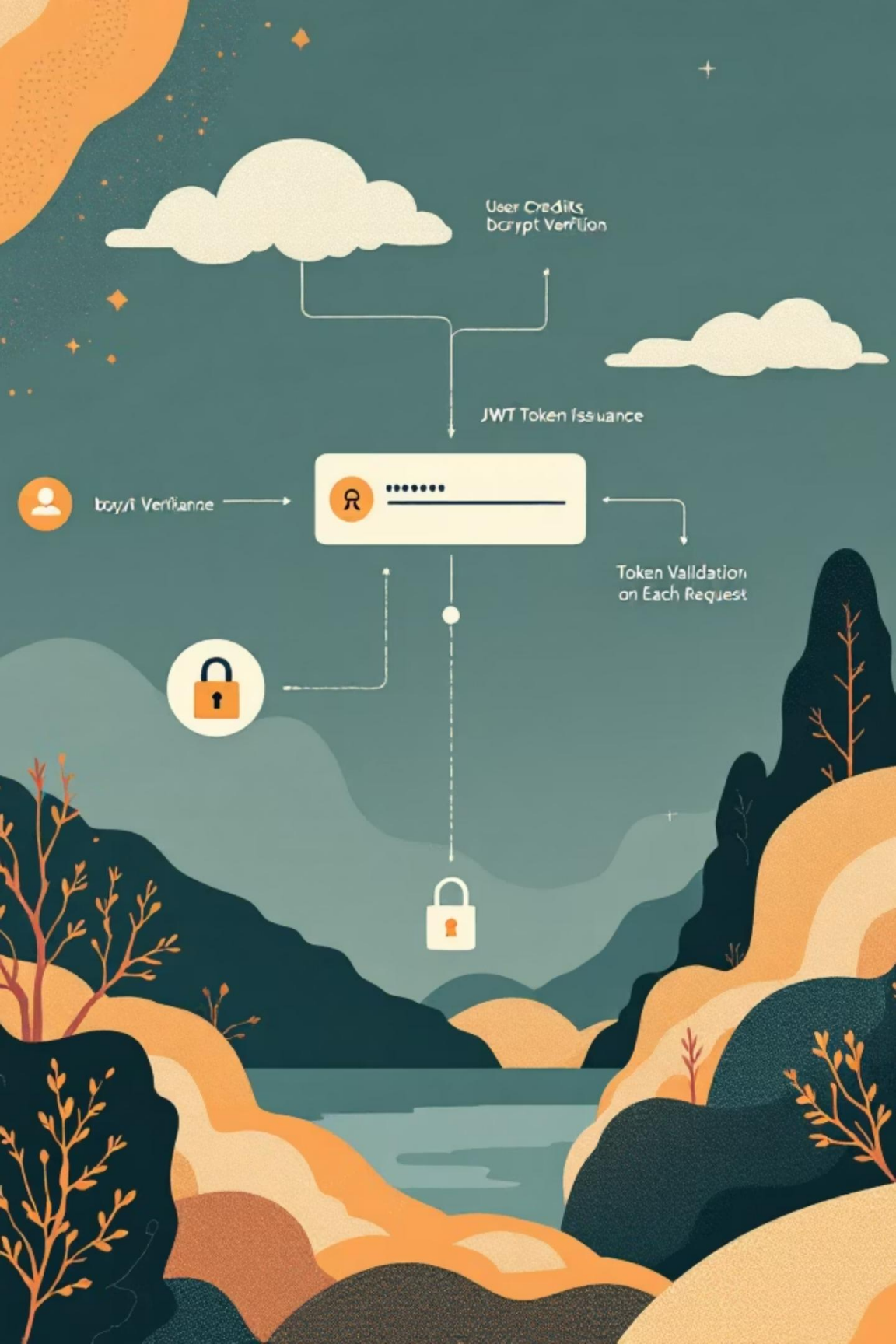
Requisitions

Line-item details, cost centers, budget references, and current status.



Purchase Orders & Approvals

PO creation, vendor linkage, approval history, and closure records for audits.



Authentication & Security

Robust authentication pipeline and defensive controls to protect procurement data and enforce least privilege.



1. Credential Verification

Passwords hashed with BCrypt; account lockout and password policies enforced.



2. JWT Issuance

Signed JWT tokens include role claims; short-lived tokens with refresh flows possible.



3. Request Validation

JWT filter validates tokens per request; role-based authorization on endpoints.



4. Defensive Practices

CORS configuration, input validation, parameterized queries, and global exception handling.

Procurement Workflow — From Requisition to Closure



The system journals each event for a complete audit trail; configurable approval chains and budget checks prevent overspend before PO issuance.



Requisition Lifecycle — Status Model



CREATED

Draft created by employee — editable until submission.



SUBMITTED

Sent to approvers; system enforces required fields and budget validations.



APPROVED

Manager/s authorized; ready for PO conversion and vendor assignment.



REJECTED

Returned with comments for correction; versioned to preserve history.



CLOSED

Linked to finalized PO and fulfillment records — immutable for audit.

Key Features & Deliverables

Automated Workflow

Configurable approvals, notifications, and PO conversion from approved requisitions.

Reporting & Export

Dynamic PDF/XLSX generation via JasperReports and Apache POI for financial and audit reports.

Audit Trail

Immutable event logging for approvals, edits, and PO lifecycle to support compliance.

Financial Controls

Automated tax calculations, budget checks, and spend validations before approvals.

Role-Based Dashboards

Admin, Manager, and Employee views with tailored KPIs and action lists.

High-Performance APIs

Optimized endpoints with pagination, indexing, and sensible caching for large datasets.

Next steps: demo environment, integration with ERP/payables, and automated test coverage to prepare for production handoff.

API Structure

Modular, RESTful APIs organized by functional areas for predictable integration and easy maintenance. Clear URI patterns support role-based access and versioning readiness.



Authentication APIs

/auth/login — session token issuance
/auth/register — onboarding new users



Vendor APIs

/vendor/create — register vendor
/vendor/all — list vendors
/vendor/{id} — vendor details



Requisition APIs

/procurement/requisition/create — submit request
/procurement/requisition/all — query requests



Purchase Order APIs

/procurement/purchase-order/create — issue PO
/procurement/purchase-order/all — list POs

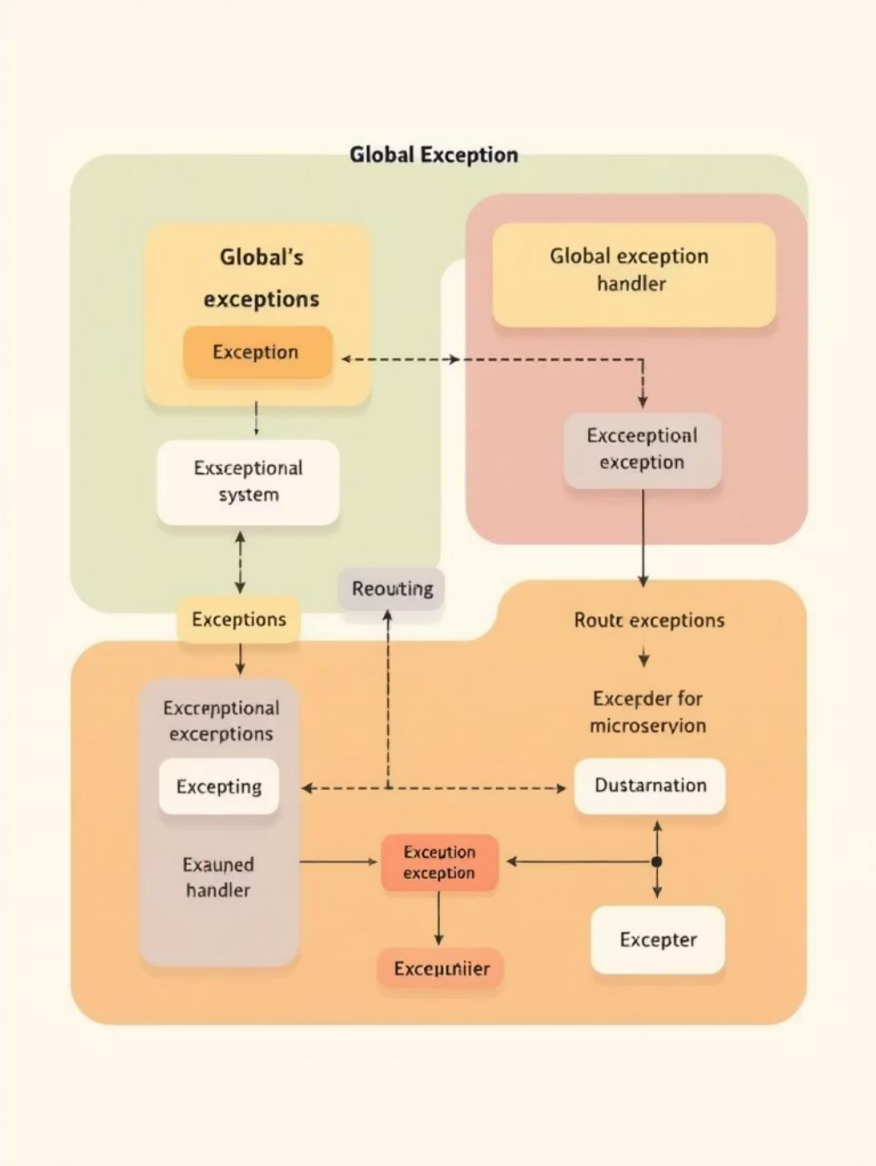


Report APIs

/reports/vendor?format=pdf — PDF export
/reports/vendor?format=excel — Excel export

Error Handling Strategy

Consistent, structured error responses improve reliability and speed up troubleshooting. Handled centrally with a clear contract for consumers.



GlobalExceptionHandler

Centralizes exception mapping to standardized HTTP responses.

Custom Exceptions

- BusinessException — domain rule violations
- ResourceNotFoundException — 404 semantics
- UnauthorizedException — authentication/authorization failures

Standard Response Body

Timestamp · Status Code · Error Message · Request Path — consistent for logging and client parsing.

Reporting & Audit Features

Robust exports and comprehensive audit trails enable compliance, manager oversight, and performance tracking.



PDF Reports

Dynamic PDF generation via JasperReports for printable, templated vendor and PO reports.



Excel Export

Apache POI-based Excel exports for analysis, filters, and downstream processing.



Performance & Summaries

Vendor performance reports and purchase order summaries for procurement insights.

An illustration of a computer monitor displaying an audit log table. The table has columns for 'Action', 'Times', 'Status', and 'Action'. It contains several rows of data, including 'Audit User', 'Audit Name', and 'Audit Date'.

Approval & Audit Trails

Approval history and manager-level audit logs preserve decision context and support compliance reviews.

System Limitations

Transparent constraints for realistic deployment planning. These are prioritized for future releases.

No payment gateway integration

Payments are out-of-scope; external payment provider integration required for end-to-end procurement finance workflows.

No vendor self-login

Vendors lack a dedicated portal — limits supplier-driven updates and self-service.

No native mobile apps

Mobile access via responsive web only; offline and native push workflows are unavailable.

Single DB instance

No sharding or multi-db partitioning — potential scalability and availability constraints for very large enterprises.

No external ERP integration

Financial and inventory sync require connectors for ERP systems (e.g., SAP, Oracle).

Future Enhancements

Roadmap items to elevate the platform to enterprise-grade capabilities — focused on automation, scalability, and supplier empowerment.



AI Spend Analytics

Predictive models for spend forecasting, anomaly detection, and supplier recommendations.



Immutable Audit Logs

Blockchain-backed ledger for tamper-evident audit trails and stronger compliance evidence.



Supplier Self-Service

Vendor portal for profile management, invoices, and status updates — reduces admin load.



Multi-DB Scalability

Sharding and read-replicas for high-volume throughput and improved fault tolerance.



Native Mobile Apps

Android/iOS apps for approvals, push notifications, and on-the-go requisitions.

Demo Outline

Planned live flow to showcase core capabilities end-to-end. Keep demo focused and timeboxed to highlight value.



Follow this sequence to demonstrate authentication, CRUD operations, approval workflow, PO conversion, and reporting exports.



Conclusion

Digitization & Efficiency

Replaces paper processes with auditable, role-based workflows that reduce cycle time.

Security & Access Control

Token-based auth and role enforcement protect sensitive procurement actions and data.

Reporting & Compliance

Exportable reports and detailed audit logs support governance and financial reconciliation.

Scalable Architecture

Designed for modular growth; roadmap addresses enterprise needs like scaling and integrations.

The system delivers a pragmatic, secure foundation for modern procurement with clear upgrade paths for enterprise adoption.



Thank You

Questions & Discussion

Next Steps

- Schedule deep-dive on integrations (ERP, payment providers)
- Prioritize roadmap items with stakeholders
- Plan pilot with representative vendor group

Contact

Product Owner · Technical Lead · Procurement PM — available for follow-ups and technical sessions.

