01 - Sync Architecture Overview

# ✨ Objective

Build a reliable, ERP-aware, API-based sync system between a centralized Main Office ERPNext server (HQ) and multiple distributed shop servers. The system must support two-way sync while allowing 24/7 offline operations in shops.

# 🏠 Roles

HQ ERP (Main Office):

- Manages: Item Master, Item Prices, Warehouse Inventory, Purchase, Accounting, Global Reporting

- Hosts and controls the sync app (erpnext\_shop\_sync)

- Receives transactional data from shops

- Pushes master data to shops

Shops (Retail Outlets):

- Operate offline with local databases

- Manage: POS sales, stock adjustments, customer creation

- Send daily transactional and inventory data to HQ

# 📊 Data Flow Summary

HQ → Shop (Push): Item, Item Group, Item Price, Purchase Receipt, Pricing Rule

Shop → HQ (Pull): Sales Invoice, Payment Entry, Stock Entry, Customer, Z-Report (Daily Summary), Inventory Summary Report, Sales Return / Refunds

# 🚀 Sync Methodology

- API-based sync using Frappe REST API

- Token authentication per shop (API Key/Secret)

- Custom app (erpnext\_shop\_sync) installed only on HQ

- Retry Queue with failover + conflict detection

- Scheduled cron jobs for background pull/push

- Manual sync option from dashboard

# 🔐 Offline Mode (Shops)

- Shops operate fully offline using local ERPNext servers

- Data queued and synced on reconnection

- POS, stock, and customer creation functional without internet

# 🧱 Technology Stack

Backend Logic: Frappe Python API + Scripts

UI Dashboard: Frappe JS + Custom Page

Database Sync: REST API + Custom Retry Queue

Auth: API Key / Secret (per shop)

Notification: Discord Webhook, Email Alerts

Logging: Sync Log Doctype

# 🔄 Example Flows

New Item Sync (HQ → Shops):

1. HQ user creates a new item

2. Hits 'Sync Items' on dashboard

3. App posts item data to /api/resource/Item on each shop

4. Status logged in Sync Log

Sales Sync (Shop → HQ):

1. Shop cron sends latest Sales Invoices with metadata

2. HQ checks reference\_number

3. If not exists, inserts invoice

4. If exists, skips or logs conflict

Daily Summary Sync:

1. Shop compiles daily Z-report and stock snapshot

2. Sends to HQ at midnight via background scheduler

3. Used for reconciliation, variance, and performance tracking

# 🌟 Key Advantages

- Offline POS support in shops

- Centralized control of pricing and inventory

- Real-time sync and monitoring

- Conflict prevention and resolution workflows

- Extensible for loyalty, returns, credit notes, and more