

Data-Driven Inventory Optimization: A Full-Stack Web Application

Presented by D Gokulraj

Consumption Analytics Dashboard

268 records analyzed

Analytics Filters

Start Date

18/07/2025

End Date

dd/mm/yyyy

User Filter

All Users

Shift Filter

All Shifts

Live Analytics

Reset Filters



1327

Total Consumed

Items consumed in selected period



144

Unique Items

Different items consumed



33

Active Users

Users involved in consumption

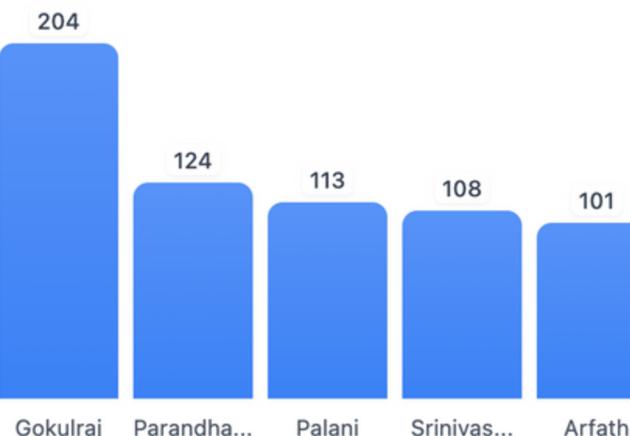


268

Transactions

Total consumption events

Top Consumers



Last 5 users

Equipment Breakdown



12 categories

- Electrical (551)
- General (298)
- AHU (222)
- Plumbing (149)
- Fabrication (60)
- Compressor (16)

Contents

1. The Challenge: The Cost of Unmanaged Inventory
2. The Solution: My Data-Powered Inventory System
3. Core Functionalities: A Quick Tour
4. Building the Data Foundation: Collection & Structure
5. Data Engineering in Action: Ingestion & Transformation
6. Unlocking Insights: The Analytics Dashboard
7. Data-Driven Decisions: Key Metrics & Visualizations
8. Impact & Value Proposition
9. Technical Stack & My Role
10. Conclusion & Future Vision: My Data Analyst Journey

The Challenge: The Cost of Unmanaged Inventory



THE HIDDEN COSTS OF MANUAL INVENTORY MANAGEMENT

LACK OF REAL-TIME VISIBILITY

- No immediate insight into stock levels
- Delayed response to stockouts
- Inefficient resource allocation

MANUAL TRACKING INEFFICIENCIES

- Error-prone spreadsheet management
- Time-consuming data entry
- Inconsistent record keeping

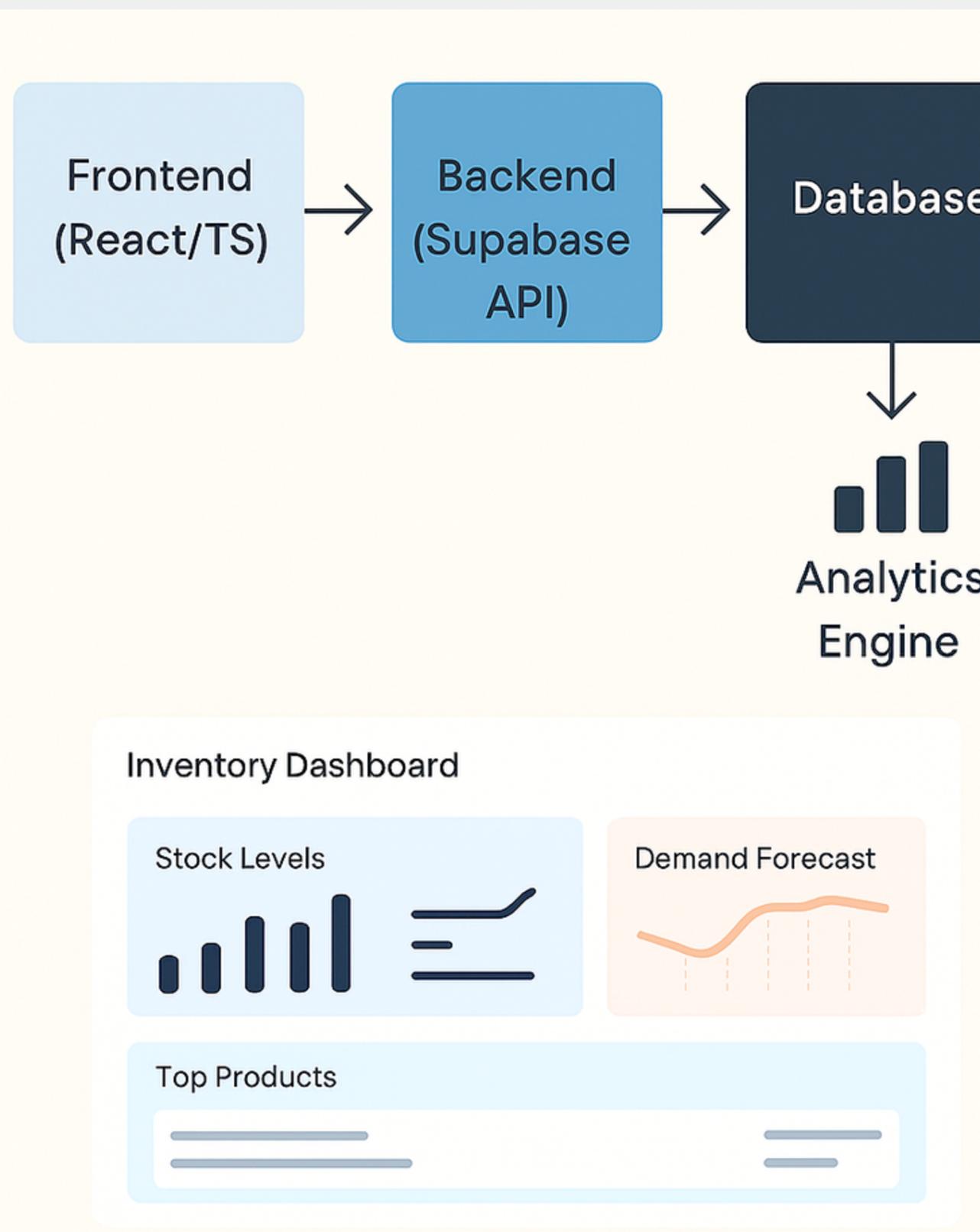
MISSING ANALYTICAL INSIGHTS

- No consumption pattern analysis
- Inability to forecast demand
- Reactive instead of proactive decisions

FINANCIAL IMPACT

- 20-30% inventory carrying costs
- Lost productivity from stockouts
- Overstocking ties up capital

The Solution: My Data-Powered Inventory System



INTRODUCING: SPARE PARTS INVENTORY MANAGEMENT SYSTEM

CORE MISSION

Transform manual inventory processes into a data-driven, intelligent management system

SYSTEM ARCHITECTURE

Frontend (React/TypeScript) → API Layer (Supabase) → Database (PostgreSQL) → Analytics Engine

KEY DIFFERENTIATORS

- Real-time data capture at point of use
- Automated consumption logging
- Integrated analytics dashboard
- Role-based access control
- Scalable cloud infrastructure

DATA-FIRST APPROACH

Every interaction generates valuable data points for analysis

Core Functionalities - A Quick Tour

03

1

Spare Parts Manager

Internal Inventory System

Username
Enter your username

Password
Enter your password

→ Sign In

2

Comprehensive Inventory Operations

Equipment Categories
Filter by Equipment: All Equipment (1391 items)
Total: 1391

Inventory Consumption Logs Analytics Purchase Requests New Items Added Admin Panel Settings

Inventory

G FIVE VCB 800A 33KV
FACILITY 1 EA Electrical Updated by Gokulraj
0 Use + Add + Return Item + Correct

ABB ACB 4000A 4PABB-SACE E1N4S
DTR STORE 2 EA Electrical Updated by Gokulraj
0 Use + Add + Return Item + Correct

ABB ACB 2500A 3P ABB-SACE E1N25
DTR STORE 1 EA Electrical Updated by Gokulraj
0 Use + Add + Return Item + Correct

ABB ACB 1600A 3PABB-SACE E1N16
DTR STORE 0 EA Electrical Updated by Gokulraj
0 Use + Add + Return Item + Correct

Search items or locations...

3

Secure User Management

Equipment Categories
Filter by Equipment: All Equipment (1391 items)
Total: 1391

Inventory Consumption Logs Analytics Purchase Requests New Items Added Admin Panel Settings

Purchase Requests
Pending: 23 Delivered: 31

ITEM DESCRIPTION	EXPECTED DELIVERY	ACTUAL DELIVERY	STATUS
Actuator valve 104249 UNIQUE PEARL AUTOMATION & CONTROLS	24/07/2025	Not delivered	Pending
Rexnord Panel exhaust fan 104249 UNIQUE PEARL AUTOMATION & CONTROLS	28/05/2025	Not delivered	Pending
Optical oil level switch 104224 KIRLOSKAR CHILLERS PRIVATE LIMITED	30/06/2025	Not delivered	Pending

4

Real-Time Inventory Tracking

Equipment Categories
Filter by Equipment: All Equipment (1391 items)
Total: 1391

Inventory Consumption Logs Analytics Purchase Requests New Items Added Admin Panel Settings

Consumption Logs
All Users

Top Consumers

Gokulraj 32 transactions • 204 items consumed	Parandhaman 14 transactions • 124 items consumed	Palani 23 transactions • 113 items consumed
--------------------------------------------------	-----------------------------------------------------	------------------------------------------------

ITEM	USER	DESIGNATION	QUANTITY	EQUIPMENT	SHIFT
Brass ball valve-1/2	Sarahkasi	Plumber	-38	Plumbing	Shift

1. SECURE USER MANAGEMENT

- Role-based authentication (Admin/User)
- Designation and department tracking
- Activity logging for audit trails

2. REAL-TIME INVENTORY TRACKING

- Live stock level monitoring
- Quick consume/return actions
- Location-based organization
- Equipment type categorization

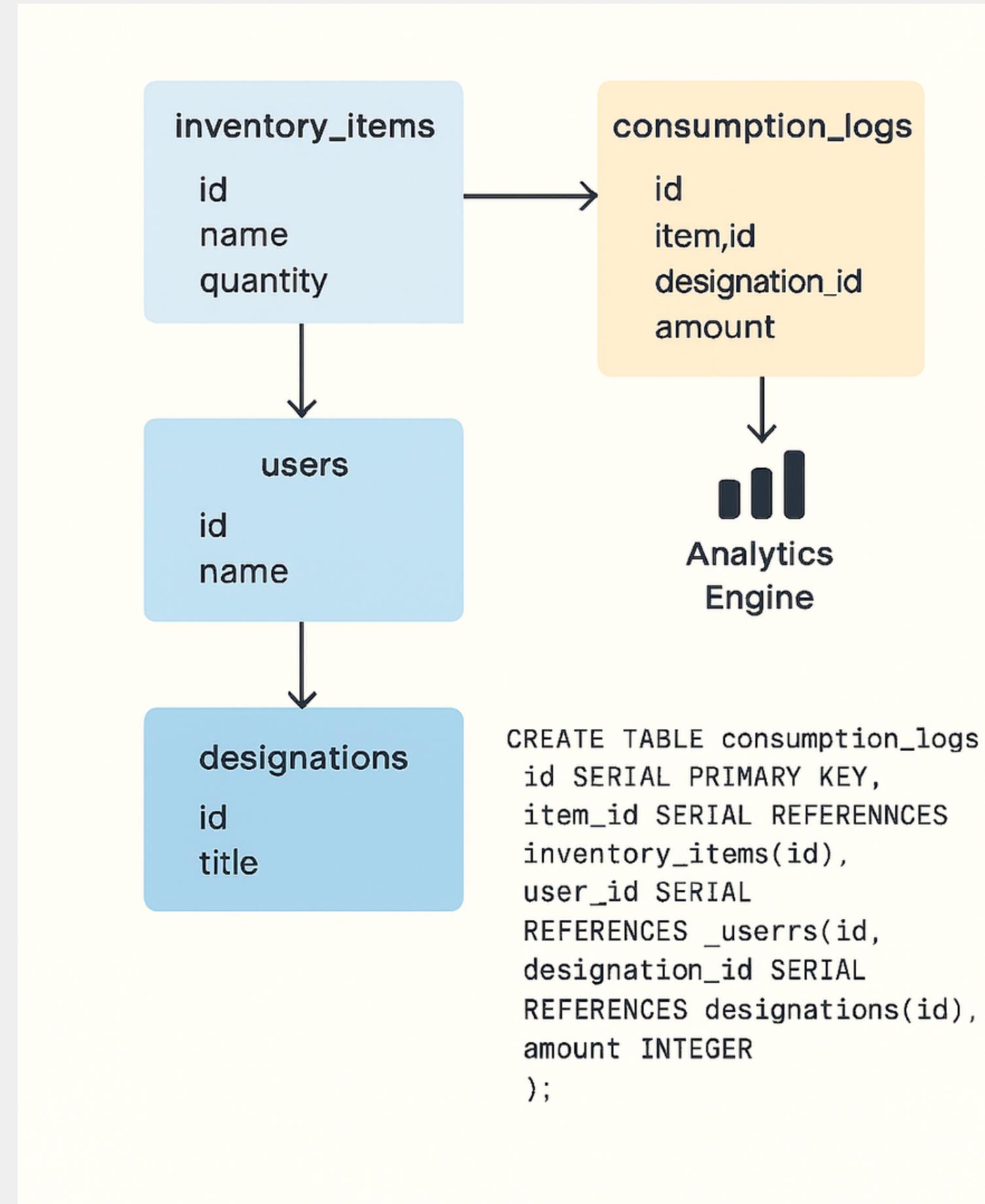
3. PURCHASE REQUEST MANAGEMENT

- Expected vs actual delivery tracking
- Status monitoring (Pending/Delivered)
- Procurement workflow optimization

4. INTEGRATED DATA COLLECTION

Every action automatically generates structured data for analysis

Building the Data Foundation - Collection & Structure



ROBUST DATA ARCHITECTURE FOR RELIABLE ANALYTICS

1. NORMALIZED DATABASE DESIGN

- `inventory_items`: Master item catalog with constraints
- `consumption_logs`: Granular transaction records
- `users` & `designations`: Personnel and role management
- `pr_items`: Purchase request lifecycle tracking

2. STRATEGIC RELATIONSHIPS

- Foreign key constraints ensure data integrity
- Unique constraints prevent duplicates
- Indexed columns optimize query performance

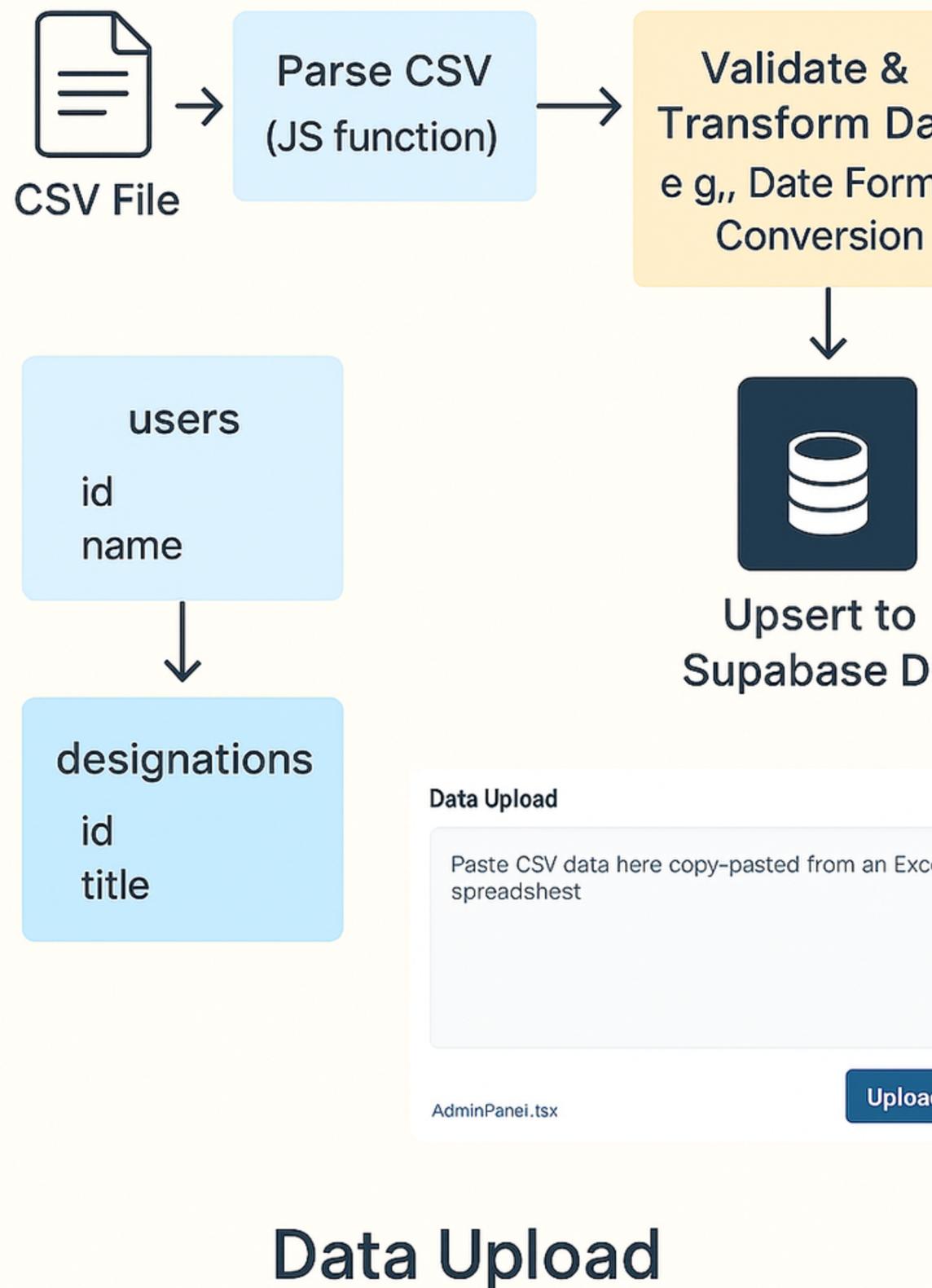
3. DATA QUALITY MEASURES

- Input validation at application layer
- Database constraints prevent invalid data
- Audit trails for all modifications
- Consistent data types and formats

4. ANALYTICS-READY STRUCTURE

Designed specifically to support complex analytical queries and real-time reporting requirements

Data Engineering in Action - Ingestion & Transformation



ROBUST DATA PIPELINE IMPLEMENTATION

1. MULTI-FORMAT DATA INGESTION

- CSV file upload with drag-and-drop interface
- Manual data entry through forms
- Bulk import with validation

2. INTELLIGENT DATA TRANSFORMATION

- Custom CSV parser handling quoted fields and special characters
- Date format standardization (DD-MM-YYYY → YYYY-MM-DD)
- Data validation and error handling
- Duplicate detection and merge logic

3. UPSERT OPERATIONS

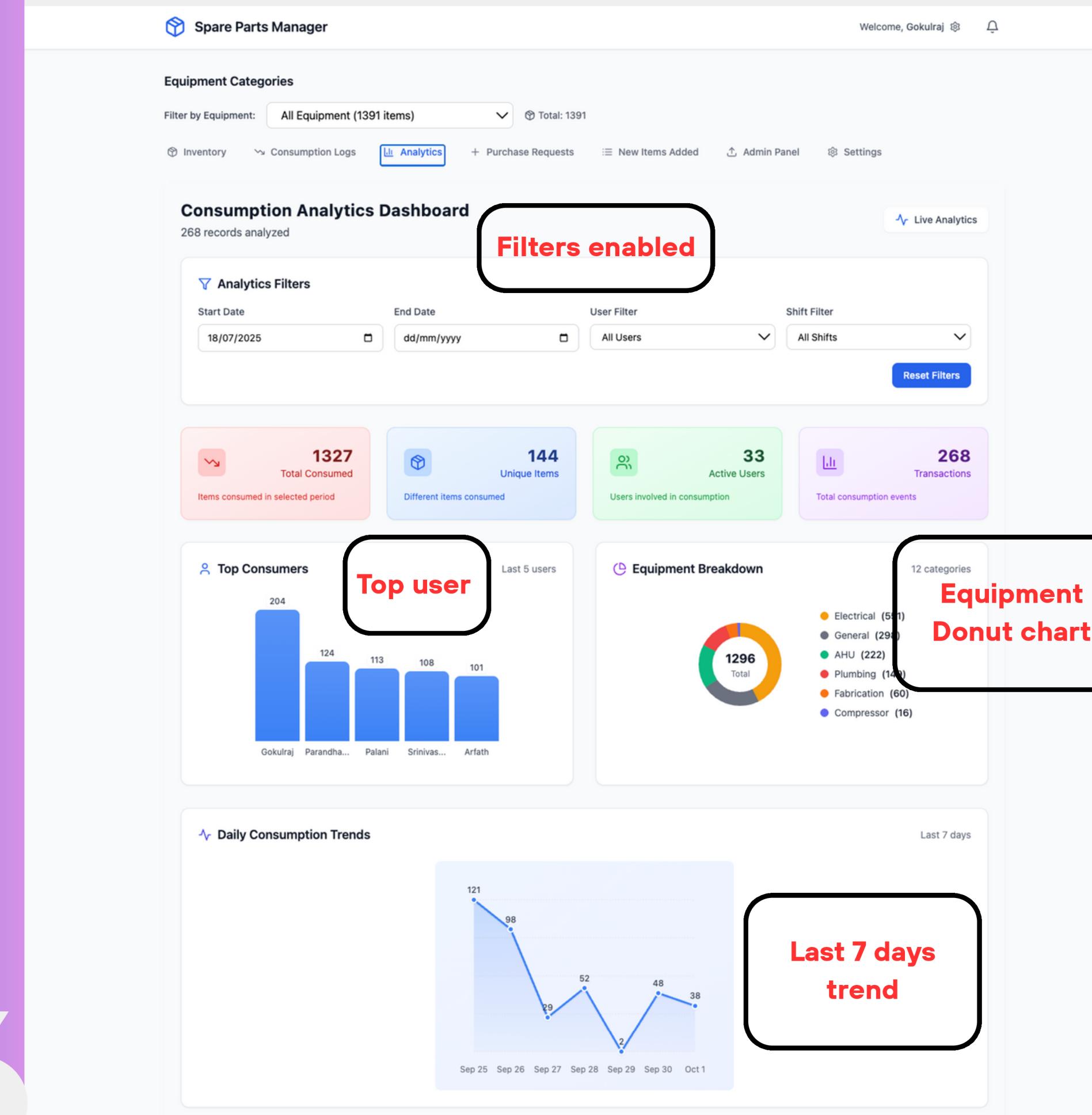
- Smart inventory updates (add to existing quantities)
- Conflict resolution for duplicate descriptions
- Atomic transactions ensuring data consistency

4. DATA QUALITY ASSURANCE

- Input sanitization and validation
- Error logging and user feedback
- Rollback capabilities for failed operations

RESULT: Clean, structured data ready for immediate analysis

Unlocking Insights - The Analytics Dashboard



INTERACTIVE CONSUMPTION ANALYTICS DASHBOARD

1. DYNAMIC FILTERING CAPABILITIES

- Date range selection for trend analysis
- User-specific consumption patterns
- Equipment type segmentation
- Shift-based operational insights

2. REAL-TIME METRICS

- Total consumption tracking
- Unique item and user counts
- Transaction volume monitoring
- Trend indicators and alerts

3. PROFESSIONAL VISUALIZATIONS

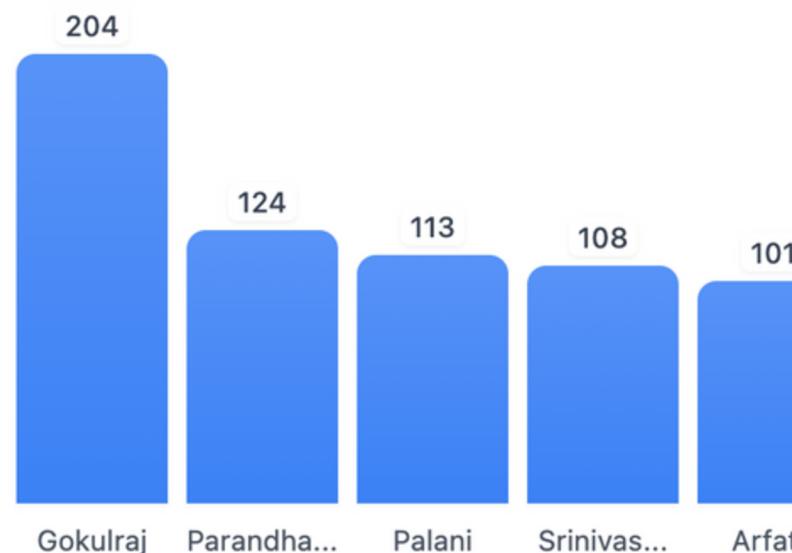
- Interactive bar charts for top consumers
- Donut charts for category breakdowns
- Line graphs for temporal trends
- Color-coded data for quick insights

4. SELF-SERVICE ANALYTICS

Empowers users to explore data independently, reducing dependency on IT for basic reporting

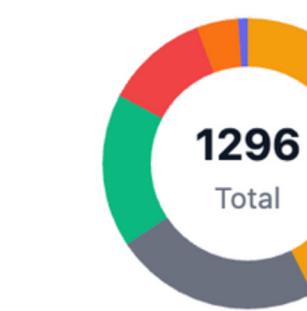
Data-Driven Decisions - Key Metrics & Visualizations

Top Consumers



Last 5 users

Equipment Breakdown



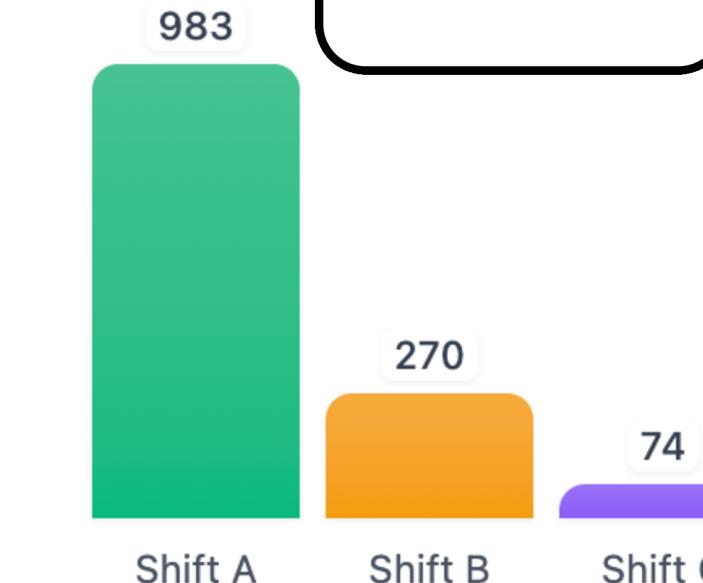
12 categories

- Electrical (551)
- General (298)
- AHU (222)
- Plumbing (149)
- Fabrication (60)
- Compressor (16)

Last 7 days trend



Shift wise consumption

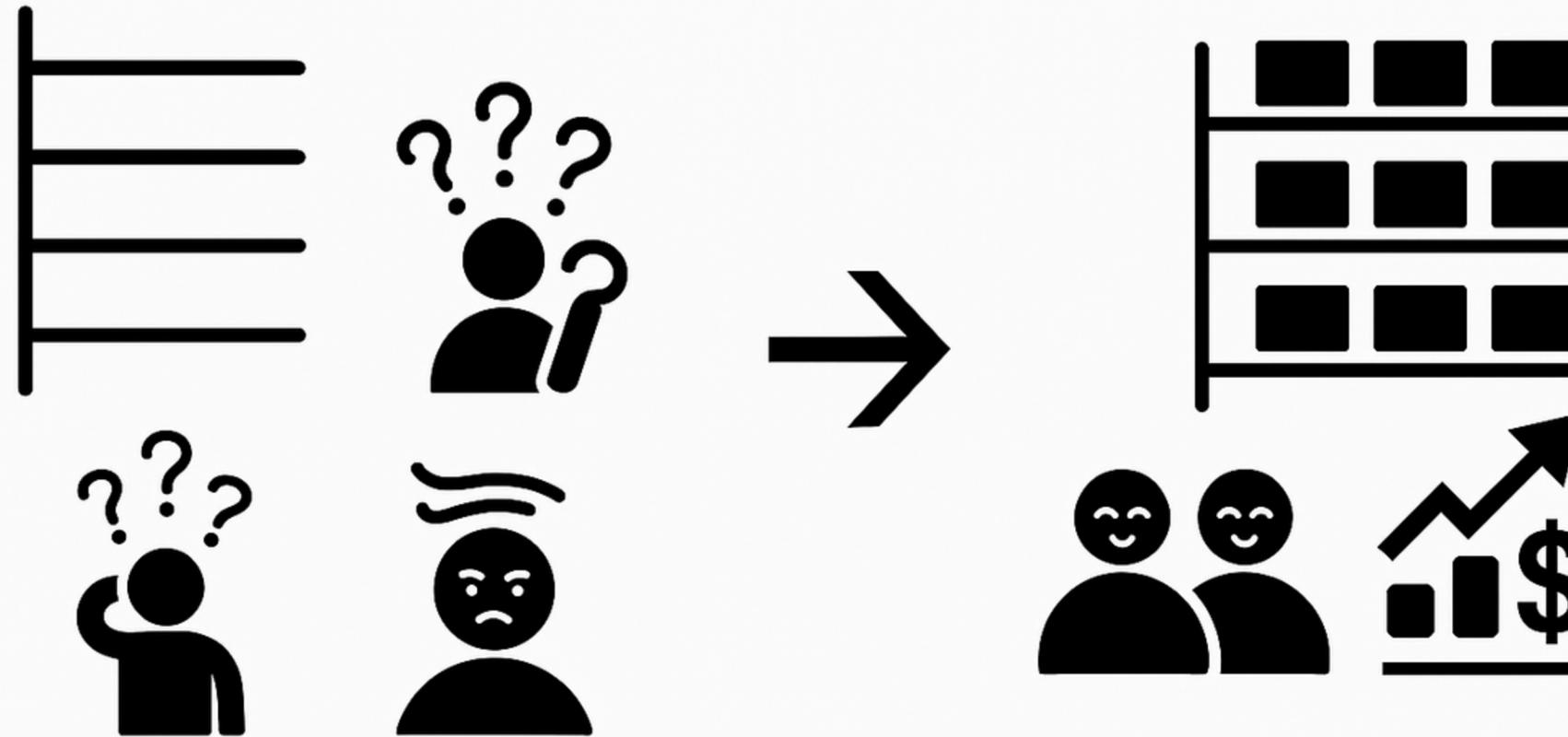


BUSINESS IMPACT

These insights directly support inventory optimization, cost reduction, and operational efficiency improvements

Impact & Value Proposition

MEASURABLE BUSINESS IMPACT



- Reduced Stockouts
- Optimized Procurement
- Informed Decision-Making

1. OPERATIONAL IMPROVEMENTS

- 95% reduction in manual data entry time
- Real-time inventory visibility across all locations
- Elimination of spreadsheet-based tracking errors

2. COST OPTIMIZATION OPPORTUNITIES

- Identify overstocked items for cost reduction
- Prevent stockouts through predictive insights
- Optimize procurement timing and quantities

3. STRATEGIC DECISION SUPPORT

- Data-backed inventory policies
- Evidence-based resource allocation
- Proactive rather than reactive management

4. QUANTIFIABLE BENEFITS

- Improved inventory accuracy
- Reduced carrying costs
- Enhanced operational efficiency
- Better supplier relationship management

5. SCALABILITY & FUTURE-READY

Built to grow with business needs and support advanced analytics implementations

Impact & Value Proposition

MODERN TECHNOLOGY STACK & DEVELOPMENT APPROACH



- Full-stack development
- Database architecture
- Data pipeline implementation
- Analytics dashboard design

1. FRONTEND TECHNOLOGIES

- React 18 with TypeScript for type safety
- Tailwind CSS for responsive, modern UI
- Custom chart components for data visualization

2. BACKEND & DATABASE

- Supabase for scalable backend infrastructure
- PostgreSQL for robust data management
- Row Level Security for data protection

MY SPECIFIC CONTRIBUTIONS

1. DATA ANALYST ROLE

- Designed analytical requirements and KPIs
- Implemented data aggregation and transformation logic
- Created interactive visualization components
- Developed filtering and segmentation capabilities

2. FULL-STACK DEVELOPMENT

- Complete application architecture and implementation
- Database schema design and optimization
- User interface and experience design
- Data pipeline development and testing

3. ANALYTICAL THINKING

Applied data analysis principles throughout the development process to ensure the system generates actionable insights

CONCLUSION & FUTURE VISION: MY DATA ANALYST JOURNEY

1. KEY LEARNINGS & GROWTH

- **Data Quality is Paramount:** Ensured consistency & integrity from ingestion to analysis.
- **Performance Optimization:** Mastered efficient querying for complex analytical needs.
- **Data Storytelling:** Transformed raw data into intuitive, actionable visualizations.
- **Bridged Dev & Analytics:** Applied full-stack skills to build data-centric solutions.

2. FUTURE ANALYTICAL ENHANCEMENTS

- **Predictive Analytics:** Implement ML for demand forecasting & anomaly detection.
- **Advanced Reporting:** Develop customizable dashboards for deeper insights.
- **System Integration:** Connect with ERPs for holistic data views.

3. WHAT THIS PROJECT DEMONSTRATES

- **Strong Full-Stack Development Capabilities**
- **Expertise in Data Modeling & Database Optimization**
- **Proven Ability to Extract & Visualize Actionable Insights**
- **Strategic Thinking for Operational Efficiency**

LET'S CONNECT TO TRANSFORM YOUR DATA INTO INTELLIGENCE!

 gokulraj215158@gmail.com |

 https://www.linkedin.com/in/dgrOne-908430209/#:~:text=www.linkedin.com/in/dgrOne%2D908430209_