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DEPARTMENT: INFORMATION TECHNOLOGY

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TECHNOLOGY PROJECT NAME: Admin dashboard with charts

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Problem Understanding & Requirements

Problem Statement

Managing and monitoring a complex application requires a centralized, real-time view of key performance indicators (KPIs) and operational metrics. Current practices often involve manual data extraction, disparate reporting tools, or static spreadsheets, leading to several challenges:

- *Delayed Insights: Data is not updated in real-time, making timely decision-making difficult.*
- *Information Overload: Raw data from various sources is hard to interpret without visual aids.*
- *Lack of Centralization: Administrators must log into multiple systems to gather a complete operational picture.*
- *Security Risks: Granular control over which metrics certain roles can view is often insufficient.*

There is a clear need for an Admin Dashboard that:

- *Provides a centralized, secure platform for monitoring core business metrics (e.g., users, sales, views).*
- *Retrieves real-time data from the backend using Node.js/Express APIs.*
- *Visualizes data using Chart.js (line, bar, pie charts) for quick and easy analysis.*
- *Implements role-based access control to ensure data security and relevance.*
- *Updates charts automatically based on fresh data fetched from the API.*

This solution aims to transform raw data into actionable intelligence for system administrators and business stakeholders.

Users & Stakeholders

Users

These are the people who directly interact with the Admin Dashboard:

- *System Administrators: Monitor system health, server load, and technical performance metrics.*
- *Business Managers: Track key business KPIs like sales, revenue, and customer acquisition rates.*
- *Marketing & Sales Teams: Analyze campaign performance, traffic sources, and conversion funnels.*
- *Product Managers: View feature usage, user engagement, and retention metrics.*

Stakeholders

These are individuals or groups who have an interest in the system but may not directly use the dashboard:

- *Project Development Team: Responsible for coding the backend (Node.js/Express/MongoDB) and integrating Chart.js on the frontend.*
- *Data Engineers: Ensure the integrity, availability, and structure of the underlying data (MongoDB).*
- *Security & Compliance Team: Define and audit the role-based access control (RBAC) rules.*
- *Investors / Company Leadership: Rely on the dashboard metrics for strategic planning and evaluating business health.*

User Stories & Stakeholder Stories

User Stories

- *As a Business Manager, I want to see a line chart of daily sales over the last 30 days, so that I can quickly identify trends and peak periods.*
- *As a System Administrator, I want to view a real-time chart of server load/API calls, so that I can detect and respond to performance bottlenecks immediately.*
- *As a Marketing Manager, I want a pie chart showing user sign-ups by geographical region, so that I can allocate ad spend more effectively.*

- *As a Product Manager, I want to see a bar chart of feature usage, so that I can prioritize future development efforts.*

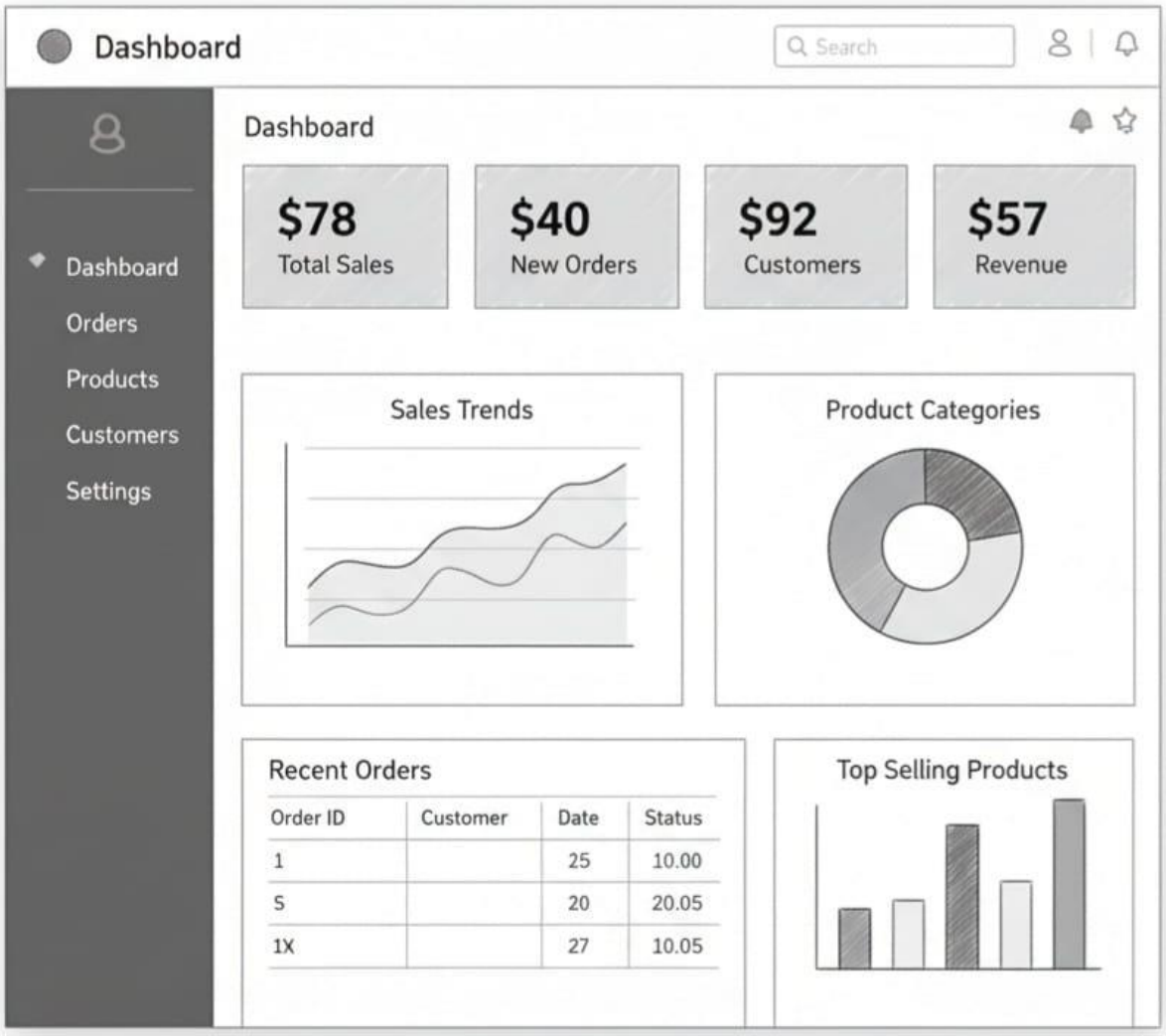
Stakeholder Stories

- *As a Developer, I want to design clear API endpoints that deliver metric data in a consistent JSON format, so that the Chart.js integration is seamless.*
- *As a System Administrator, I want to implement MongoDB aggregation queries efficiently, so that complex metrics are computed and served quickly.*
- *As a Security Team Member, I want to enforce role-based access control on all API endpoints, so that sensitive data is only visible to authorized personnel.*

MVP [Minimum Viable Product] Features

1. *Metric Computation Backend (Node.js/Express/MongoDB)*
    - *Backend logic to compute at least three core metrics (e.g., Total Users, Daily Sales, Total Views).*
    - *APIs must be protected by a basic authentication layer.*
2. *API Endpoint for Metrics*
    - *A single API endpoint (e.g., /api/metrics/summary) that returns all dashboard data in a structured JSON object.*
3. *Basic Chart Display (Frontend)*
    - *Display the three core metrics using Chart.js.*
    - *At least one chart must be a Bar Chart and one a Line Chart.*
4. *Auto-Update Functionality*
    - *The frontend charts automatically refresh/update by fetching new data from the API every 30 seconds.*
5. *Role-Based Data Filtering (Simplified)*
    - *A basic mechanism to show/hide one specific metric chart based on the logged-in user's role (e.g., only "Admin" role sees the "Sales" chart).*

Wireframes & API Endpoint List



API Endpoint List

Endpoint	*Method*	*Description*	*Request Parameters*	*Response*
/api/metrics/chartdata	*GET*	*Fetch detailed data for a specific chart.*	*chartName (query) – e.g., 'salesTrend'*	*JSON: { labels: ["Mon", "Tue", ...], data: [100, 150, ...] }*
/api/auth/login	*POST*	*Authenticate a user and return their role.*	*username, password (body)*	*JSON: { token, role: "Admin" }*

Acceptance Criteria

Data Computation & API

- *The backend must successfully compute and return JSON data for the three core metrics.*
- *The API endpoint /api/metrics/summary must respond in under 2 seconds.*
- *The API must return a 403 Forbidden error if an unauthorized user attempts to access protected metric data.*

Chart Visualization (Frontend)

- *The frontend must use Chart.js to render the fetched data as a visually clear and readable Bar Chart and Line Chart.*
- *Chart axes, labels, and titles must be clearly defined and derived from the JSON data.*
- *Charts must accurately reflect the data received from the backend API.*

Performance & Updates

- *Charts must refresh data from the API automatically every 30 seconds.*
- *The auto-update process should be smooth and not disrupt the user interface.*

Access Control

- *When a user with the "Basic" role logs in, they should not see the "Sales" chart.*
- *When a user with the "Admin" role logs in, they must see all charts, including the "Sales" chart*.