

SOLVERDEV SOLUTION

We arrive and survive with tech

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Mining Order Management System

Phase 1

Organization Details

- **Name:** Khula Mining Corporation
- **Industry:** Surface and underground mining (coal, chrome, manganese)
- **Location:** Limpopo, South Africa
- **Operations:** Extraction, crushing, transport, equipment maintenance
- **Departments:** Procurement, Operations, Warehouse

Client Requirements Gathering

Purpose

The goal of gathering requirements is to ensure MOMS aligns with the operational needs of Khula Mining Corporation, solving real problems in procurement, stock management, and supplier coordination.

Pre-Meeting Research

- Understand the organization's structure and departments.
- Study workflows for Procurement, Operations, and Warehouse.
- Identify current challenges and inefficiencies.
- Assess technology infrastructure (desktop and mobile availability).

Sample Questions for the Client

1. How are material requests currently submitted, tracked, and approved?
2. What challenges exist between departments in coordinating orders?
3. How do warehouse staff verify stock and manage dispatches?
4. Which reports are most critical for operations and management?
5. How are suppliers evaluated and tracked?
6. What causes delays in material or equipment deliveries?
7. Are mobile devices commonly used on-site?
8. Are there budgetary or regulatory constraints the system must follow?

Conducting the Meeting

- Listen actively and clarify ambiguities.

- Document workflows, inputs, outputs, and pain points.
- Identify constraints such as operational, financial, or technical limitations.

Using Requirements for System Design

- Organize requirements into functional and non-functional categories.
- Map workflows that reflect real operations.
- Prioritize critical features first.
- Design dashboards, reporting modules, and mobile-friendly interfaces based on client needs.

Advantages of MOMS

- Eliminates errors and duplicate orders.
- Improves operational efficiency in extraction, crushing, transport, and maintenance.
- Enhances accountability and transparency.
- Supports mobile access for remote mining sites.
- Provides real-time stock monitoring and supplier tracking.
- Reduces delays, downtime, and operational costs.

Problem Domain

Khula Mining Corporation operates in remote mining sites where manual order handling has led to most material and equipment orders are placed manually through paperwork or phone calls. Records are kept in physical logbooks, and there is often a lack of synchronization between departments. This led to problems such as lost orders, delayed shipments, double orders, inaccurate stock records, and an inability to generate real-time reports or plan future purchases effectively. These inefficiencies slow down production and increase operational costs.

Solution Domain

The purpose of the project is to create a centralized digital platform for managing and tracking orders in mining operations. The new system will allow field personnel to request materials, allow warehouse supervisors to verify stock and manage dispatches, and enable procurement officers to track supplier performance and approve purchases. By integrating all stakeholders into one platform with mobile compatibility, the mining operation can reduce delays, prevent resource shortages, and ensure transparency in the ordering process.

Business Processes

The current business workflow involves multiple steps across departments:

1. Operations staff identify a need for tools or equipment.
2. They submit a manual request (paper or verbal) to the procurement team.
3. Procurement contacts suppliers via phone or email.
4. Once an order is placed, management manually approves high-cost items.
5. The warehouse team receives and stores the delivery.
6. There is no formal stock tracking or reporting system in place.

System Requirements

1. Functional Requirements

These define what the system **must do** to meet user and organizational needs:

- **User Management**
 - Register, update, and delete users.
 - Assign roles: Admin, Supervisor, Supplier.
 - Enforce role-based access control.
- **Material Request Management**
 - Create material/equipment requests with categories, quantities, and urgency levels.
 - Track requests through approval stages (Pending → Approved → Declined → Dispatched → Delivered).
 - Allow supervisors to report damaged, missing, or delayed stock.
- **Approval Workflow**

- Admin can approve or decline requests.
- Multi-level approvals for high-cost items.
- Notifications to supervisors and suppliers on approval status.
- **Inventory Management**
 - Track stock levels in real-time.
 - Generate low-stock alerts.
 - Manage warehouse inflow/outflow of materials.
- **Supplier Management**
 - Maintain supplier records (contact info, performance history, delivery times).
 - Assign purchase orders to suppliers.
 - Allow suppliers to update delivery status and upload invoices.
- **Reporting & Analytics**
 - Generate reports on order history, stock usage, supplier performance, and delays.
 - Exportable reports in PDF/Excel formats.
- **Notification System**
 - Send alerts via email or SMS for:
 - New orders
 - Approvals /declines
 - Low stock warnings
 - Delivery updates
- **Offline Support**
 - Allow mobile users to create and save requests offline.
 - Sync data automatically when connectivity is restored.

2. Non-Functional Requirements

These define **how the system performs** and the constraints under which it operates:

- **Accessibility**
 - Accessible via desktop and mobile devices.
 - Support for low-end devices commonly used in mining environments.
- **Performance**
 - Fast response times (<2 seconds for key operations).
 - Support concurrent users without system lag.
- **Security**

- Role-based authentication and authorization.
- Data encryption in transit and at rest.
- Regular audit logs of user activities.
- **Usability**
 - Intuitive interface for non-technical users.
 - Clear dashboards for Admin, Supervisor, and Supplier.
- **Reliability**
 - High system uptime (99% availability)
 - Error handling and backup mechanisms.
- **Scalability**
 - Ability to add more users, suppliers, and warehouses as the company grows.
 - Support for future integration with ERP or accounting systems.

Functions of the System

The Mining Order Management System (MOMS) will consist of the following **core modules**:

1. Admin Dashboard

- a. Manage system users (add, update, deactivate accounts).
- b. Approve or decline material requests.
- c. Track inventory flows across warehouses.
- d. Generate reports for operations, procurement, and supplier performance.
- e. Configure notifications and system settings.

2. Supervisor Dashboard

- a. Create and submit material/equipment requests.
- b. Track request status (Pending → Approved → Declined → Delivered).
- c. Report damaged, missing, or delayed stock.
- d. View available stock levels for planning purposes.
- e. Communicate directly with suppliers regarding orders.

3. Supplier Dashboard

- a. View assigned purchase orders.
- b. Update delivery status (Pending, In-Transit, Delivered).
- c. Upload invoices and delivery confirmations.
- d. Access historical order data and performance metrics.

4. Reporting System

- a. Generate downloadable and printable reports:
 - i. Inventory levels

- ii. Material requests and approvals
- iii. Supplier performance and delivery times
- iv. Cost and usage analytics

5. Notification System

- a. Alerts for supervisors and suppliers via email or SMS for:
 - i. New requests
 - ii. Approval decisions
 - iii. Low stock warnings
 - iv. Delivery updates

Stakeholders & Roles

Stakeholder	Role / Responsibility	System Interaction
Admin	Oversees procurement, inventory, and approvals	Admin dashboard for user management, approvals, reports
Supervisor	Requests materials and monitors usage	Supervisor dashboard for creating requests and tracking status
Supplier	Delivers materials and confirms invoices	Supplier dashboard for updating delivery status and uploading invoices
Operations Manager	Monitors overall operations and material flow	View dashboards, track approvals, monitor inventory
Warehouse Supervisor	Manages stock storage and dispatch	Confirm deliveries, update inventory levels
Field Personnel	Submits requests from mining sites	Use supervisor dashboard to submit and track requests

Inputs, Outputs, and Processing Components

- **Inputs**
 - Material request forms (item name, quantity, priority level)
 - Delivery confirmations
 - Inventory updates
 - Supplier details and pricing
 - User credentials and role types
- **Outputs**
 - Purchase order documents
 - Inventory and stock reports

- Approval notifications and alerts
- Supplier performance metrics
- Delivery tracking updates
- **Processing Components**
 - Material request workflow engine
 - Inventory management module
 - Supplier database and ordering system
 - Notification and alert system
 - Data visualization dashboards for reporting

Identification of the system

Introduction

The **Mining Order Management System (MOMS)** is designed to streamline and automate procurement, stock management, and logistics processes within mining operations. Manual order handling traditionally reliant on paperwork or phone calls is prone to errors, delays, and inefficiencies. MOMS replaces these processes with a centralized digital platform that tracks material requests, stock levels, supplier deliveries, and internal approvals.

The system features **role-based dashboards** tailored for three primary stakeholders:

1. **Operations Manager** – Monitors overall material requests, supplier performance, and departmental approvals.
2. **Warehouse Supervisor** – Manages stock inventory, verifies material availability, and coordinates dispatches.
3. **Procurement Officer** – Oversees supplier interactions, approves purchase requests, and ensures compliance with procurement policies.

MOMS is designed as both a **desktop application and a mobile app**, enabling accessibility for users in remote or resource-limited mining environments

Scope of the System

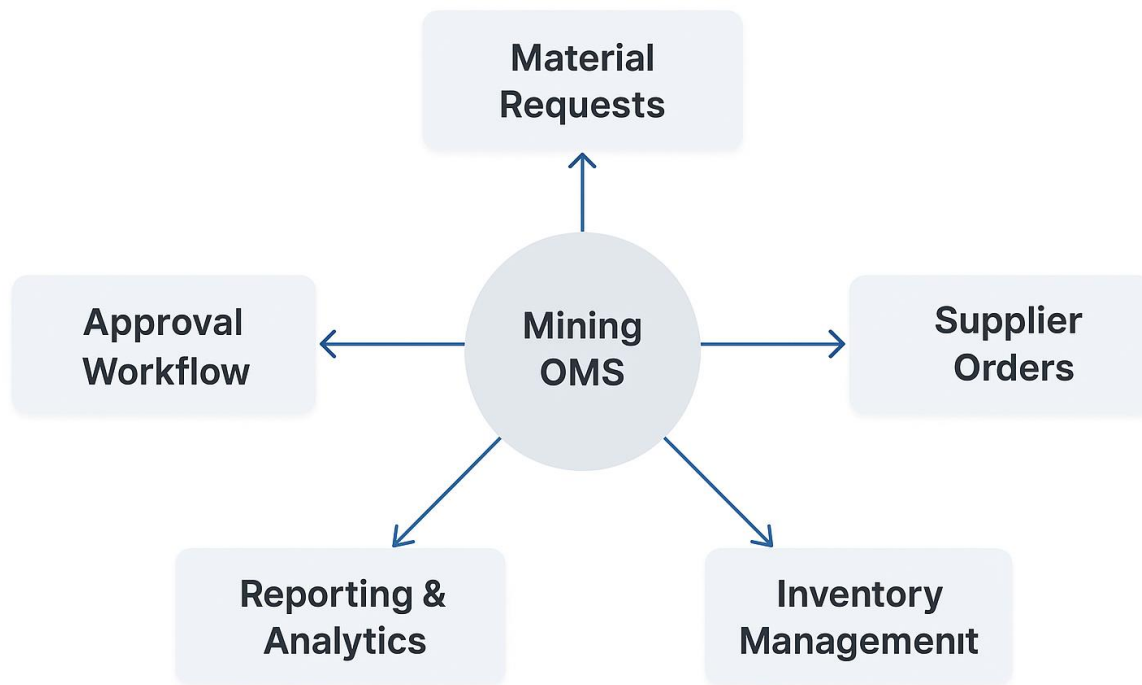


Figure 1: Scope of the Proposed Mining Order Management System (OMS)

The Order Management System for Mining Operations is designed to digitize and streamline the end-to-end process of ordering, tracking, and managing materials, tools, and equipment required in mining activities. The system serves as an all-in-one solution for managing inventory requests, supplier coordination, order approvals, and delivery monitoring, ensuring timely and efficient resource allocation to mining sites.

This software system will support three primary dashboards to accommodate various stakeholders:

1. **Admin Dashboard** – used for managing users, approving or declining orders, tracking inventory flow, and generating reports.
2. **Supervisor Dashboard** – allows mining site supervisors to create material requests, check order statuses, and report damaged or missing stock.
3. **Supplier Dashboard** – gives external or internal suppliers access to view purchase orders, update delivery status, and upload invoices.

The system will be delivered as both a **desktop application** and a **mobile application**, acknowledging that mining staff and supervisors may not always have access to laptops or PCs in the field. The mobile version ensures accessibility and usability in rugged environments.

Features in Scope:

- User registration, authentication, and role-based access control.
- Material request creation, tracking, and approval workflow.
- Inventory tracking with automatic low-stock alerts.
- Supplier management and purchase order assignment.
- Notification system (email or SMS) for real-time updates.
- Reporting module for procurement analysis and delivery timelines.
- Offline mobile data entry with sync capability when connected.

Features out of Scope:

- Full accounting or payroll functionalities.
- HR management system integration.
- Real-time GPS tracking of delivery vehicles (may be considered in future iterations).
- Third-party supplier price negotiation tools.

The system will be developed with simplicity, reliability, and ease of use in mind, supporting the operational efficiency of mining environments and reducing the delays and errors caused by manual order processing methods.

Phase 2

High-Level Team Plan – MOMS Project

1. Team Commitments & Availability

- **Assignments & Exams:** Team members will have reduced availability during **Assessment Weeks** (Week 5, Week 8, Week 9). Sprint workload will be lighter during these weeks.

- **General Availability:** Team members will commit **6–8 hours per week** outside of class for this project.
- **Scheduling Meetings:** One team member (Project Manager role) will be responsible for scheduling weekly meetings via Teams/WhatsApp and ensuring reminders are in everyone's calendars.

2. Contingency Planning

- **If Lead Developer is ill/unavailable:**
 - Work will continue as all major modules will use **pull requests** and **code reviews** so multiple team members understand the code.
 - Backup developer will take over with guidance from documentation.
- **If Deliverables Clash with Exams:**
 - Major sprint deadlines will be moved to before or after assessment weeks.
 - Buffer time will be added to reduce pressure.
- **If Scope is Too Large:**
 - Prioritize **core features** (Inventory, Order Processing, Reports) and defer secondary features (Advanced analytics, extra dashboards) to after Week 8.

3. Agile Planning Approach

- We will follow **Scrum** with **2-week sprints**.
- **Sprint ceremonies:**
 - **Planning** – Define backlog items and assign tasks.
 - **Daily/Weekly Stand-ups** – Quick progress updates (15–20 mins).
 - **Review/Demo** – Show completed features to lecturer/client.
 - **Retrospective** – Discuss improvements and challenges.
- **Pull Request Reviews:**
 - No code will be merged into **main** without at least **one review**.
 - This ensures code quality and knowledge sharing.

4. Roadmap (10 Weeks)

Week	Focus	Deliverable
Week 1	Setup	GitHub/Azure DevOps repo, roles assigned, backlog created

Week 2	Requirements	Mock-ups, system requirements, client feedback
Week 3	Sprint 1 – Core Setup	User authentication (Admin, Supplier, Supervisor)
Week 4	Sprint 2 – Core Features	Material Request & Inventory Management
Week 5	Assessment Week	Light tasks only (Documentation update, minor fixes)
Week 6	Sprint 3	Supplier Dashboard – Order Viewing & Delivery Updates
Week 7	Sprint 4	Admin Dashboard – Reports, Approvals, User Management
Week 8	Assessment Week	Focus on bug fixing & testing only
Week 9	Sprint 5	Payment Processing & Notification System
Week 10	Final Sprint	System integration, final testing, client demo

5. Continuous Improvement

- **Feedback Loops:** Prototypes will be shown to lecturer/client after each sprint.
- **Scope Adjustment:** Features may be reduced if workload exceeds availability.
- **Team Retrospectives:** Discuss over-commitments, balance workload in future sprints.

6. DevOps Organization

Setting up Azure Boards Project

Create a new Azure Boards project within Azure DevOps



Mining Order Operation Management

Private

Invite



About this project

Like 0

The Order Management System for Mining Operations is designed to digitize and streamline the end-to-end process of ordering, tracking, and managing materials, tools, and equipment required in mining activities. The system serves as an all-in-one solution for managing inventory requests, supplier coordination, order approvals, and delivery monitoring, ensuring timely and efficient resource allocation to mining sites.

Project stats

Period: Last 7 days

Boards

0 Work items created

8 Work items completed

Members 3



Team Member



Mining Order Operation Management Team

The default project team.

Relevant links: [Notifications](#) | [Dashboards](#) | [Iterations and Area Paths](#)

Members Settings

Search users and groups

Total 3

Direct Members

Add

<input type="checkbox"/>	Name	Type	Username, Scope, or App Id
<input type="checkbox"/>	<div>PP</div> Phuti Thabiso Phaka Admin ST10219717@rconnect.edu.za	aad user	ST10219717@rconnect.edu.za
<input type="checkbox"/>	<div>RK</div> Rhulani Kobeni Admin rkobeni@rosebankcollege.co.za	aad user	rkobeni@rosebankcollege.co.za
<input type="checkbox"/>	<div>SN</div> Sylvester Zwavhudi Netswingan... Admin ST10193141@rconnect.edu.za	aad user	ST10193141@rconnect.edu.za

Sprints

Iterations	Start Date	End Date
▼ Mining Order Operation Management		
Project Foundation	6/28/2025	8/1/2025
Supervisor Material Requests	8/4/2025	8/8/2025
Inventory (Admin)	8/11/2025	8/15/2025
Pause or Testing	8/18/2025	8/22/2025
Order Approvals (Admin)	8/25/2025	8/29/2025
Supplier Dashboard	9/1/2025	9/12/2025
Reporting Admin and Supervisor	9/15/2025	9/19/2025
Mid-term Submission	9/22/2025	9/26/2025
Payment Processing	9/29/2025	10/3/2025
QA- Testing	10/6/2025	10/10/2025
Deployment and Final Delivery	10/13/2025	10/17/2025

Define user stories, epics, and tasks that capture the functional and non-functional

requirements of the Mining Order Management System

Epics

Order	Work Item Type	Title	State	Effort	Busin...	Value Area	Start Date	Target Date
1	Epic	> 👑 System Quality & Delivery	● Resolved	9		Business	10/9/2025 12:0...	10/15/2025 12:...
2	Epic	> 👑 Payments & Reporting	● Resolved	9	8	Business	10/16/2025 12:...	10/21/2025 12:...
3	Epic	> 👑 Supplier Management & Orders	● Resolved		7	Business	10/2/2025 12:0...	10/8/2025 12:0...
4	Epic	> 👑 Authentication & Setup	● Resolved	8	6	Business	9/25/2025 12:0...	10/2/2025 12:0...
5	Epic	> 👑 Inventory & Material Requests	● Resolved	8	8	Business	10/2/2025 12:0...	10/8/2025 12:0...

Stories

Backlog Analytics

<div><div>+</div><div>-</div></div>	Order	Work Item Type	Title	State	Story...	Value Area	Iteration Path
	1	User Story	> 🧑🏿 Configure GitHub Repo + CI/CD Pipeline for mining order ...	● Active		Business	Mining Order Operation Manage...
	2	User Story	> 🧑🏿 As a client, I want the system deployed so I can use it.	● Active		Business	Mining Order Operation Manage...
	3	User Story	> 🧑🏿 As a supervisor, I want to create material requests so I can o...	● Resolved		Business	Mining Order Operation Manage...
	4	User Story	> 🧑🏿 As a supplier, I want to view purchase orders so I can prepar...	● Resolved		Business	Mining Order Operation Manage...
	5	User Story	> 🧑🏿 As an admin, I want to generate system reports so I can mo...	● Resolved		Business	Mining Order Operation Manage...
	6	User Story	> 🧑🏿 As a supplier, I want to update delivery status so supervisor...	● New		Business	Mining Order Operation Manage...
	7	User Story	> 🧑🏿 As a team, we want to test the system so it works correctly.	● New		Business	Mining Order Operation Manage...

Task

Work items

Recently updated

+ New Work Item

↶ Open filtered view in Queries

🔗 Column Options

📄 Import Work Items

🗑 Recycle Bin

Filter by keyword

Task Assigned to States Area Tags

ID	Title	Assigned To	State	Area Path	Tags	Comments	Activity Date
44	📄 Payment Report	👤 Phuti Thabiso Phaka	🟡 New	Mining Order Operation Mana...			10/22/2025 9:22:32 AM
43	📄 Inventory Report	👤 Sylvester Zwavhudi Netswi...	🟡 New	Mining Order Operation Mana...			10/22/2025 9:22:26 AM
42	📄 Sales/Order Report	👤 Sylvester Zwavhudi Netswi...	🟡 New	Mining Order Operation Mana...			10/22/2025 9:22:18 AM
39	📄 Generate payment receipts	👤 Sylvester Zwavhudi Netswi...	🟡 New	Mining Order Operation Mana...			10/22/2025 9:21:45 AM
38	📄 Add invoice validation	👤 Sylvester Zwavhudi Netswi...	🟡 New	Mining Order Operation Mana...			10/22/2025 9:21:40 AM
37	📄 Implement payment module	👤 Sylvester Zwavhudi Netswi...	🟡 New	Mining Order Operation Mana...			10/22/2025 9:21:34 AM
53	📄 Final client demo	👤 Sylvester Zwavhudi Netswi...	🟡 New	Mining Order Operation Mana...			10/22/2025 9:20:35 AM
54	📄 Handover documentation	👤 Phuti Thabiso Phaka	🟡 New	Mining Order Operation Mana...			10/22/2025 9:20:28 AM
47	📄 Unit testing	👤 Sylvester Zwavhudi Netswi...	🟡 New	Mining Order Operation Mana...			10/22/2025 9:19:56 AM
48	📄 Integration testing	👤 Phuti Thabiso Phaka	🟡 New	Mining Order Operation Mana...			10/22/2025 9:19:45 AM
49	📄 User acceptance testing	👤 Sylvester Zwavhudi Netswi...	🟡 New	Mining Order Operation Mana...			10/22/2025 9:19:34 AM
31	📄 Create delivery status update page	👤 Phuti Thabiso Phaka	🟡 New	Mining Order Operation Mana...			10/22/2025 9:18:41 AM
28	📄 Upload invoice functionality	👤 Phuti Thabiso Phaka	🟡 New	Mining Order Operation Mana...			10/22/2025 9:18:05 AM
26	📄 Design Supplier Dashboard UI	👤 Sylvester Zwavhudi Netswi...	🟡 New	Mining Order Operation Mana...			10/22/2025 9:17:37 AM
52	📄 Deploy to Azure environment	👤 Phuti Thabiso Phaka	🟡 New	Mining Order Operation Mana...			9/15/2025 9:40:03 PM
27	📄 Implement order viewing	👤 Sylvester Zwavhudi Netswi...	🟡 New	Mining Order Operation Mana...			9/15/2025 8:54:32 PM
22	📄 Generate inventory usage reports	👤 Unassigned	🟡 New	Mining Order Operation Mana...			9/15/2025 6:00:58 PM
21	📄 Add low-stock alerts	👤 Unassigned	🟡 New	Mining Order Operation Mana...			9/15/2025 6:00:58 PM

work items into categories based on their priority and dependencies

ID	Title	Assigned To	State	Area Path	Priority	Activity Date	
23	👑 Supplier Management & Orders	👤 Phuti Thabiso Phaka	🟢 Resolved	Mining Order Operation Mana...	2	10/22/2025 12:06:03 P...	
33	👑 Payments & Reporting	👤 Sylvester Zwavhudi Netswi...	🟢 Resolved	Mining Order Operation Mana...	2	10/22/2025 10:34:39 A...	
1	👑 Authentication & Setup	👤 Phuti Thabiso Phaka	🟢 Resolved	Mining Order Operation Mana...	2	10/22/2025 10:33:56 A...	
12	👑 Inventory & Material Requests	👤 Unassigned	🟢 Resolved	Mining Order Operation Mana...	2	10/22/2025 10:33:16 A...	
34	👑 System Quality & Delivery	👤 Sylvester Zwavhudi Netswi...	🟢 Resolved	Mining Order Operation Mana...	2	10/22/2025 10:32:42 A...	
5	🔧 Configure GitHub Repo + CI/CD Pipeline for mining order managem...	👤 Phuti Thabiso Phaka	🟡 Active	Mining Order Operation Mana...	2	10/22/2025 10:05:16 A...	
51	👤 As a client, I want the system deployed so I can use it.	👤 Phuti Thabiso Phaka	🟡 Active	Mining Order Operation Mana...	2	10/22/2025 9:48:45 AM	
41	👤 As an admin, I want to generate system reports so I can monitor oper...	👤 Phuti Thabiso Phaka	🟢 Resolved	Mining Order Operation Mana...	2	10/22/2025 9:48:38 AM	
25	👤 As a supplier, I want to view purchase orders so I can prepare deliveri...	👤 Sylvester Zwavhudi Netswi...	🟢 Resolved	Mining Order Operation Mana...	2	10/22/2025 9:48:35 AM	
44	📄 Payment Report	👤 Phuti Thabiso Phaka	🟡 New	Mining Order Operation Mana...	2	10/22/2025 9:22:32 AM	
43	📄 Inventory Report	👤 Sylvester Zwavhudi Netswi...	🟡 New	Mining Order Operation Mana...	2	10/22/2025 9:22:26 AM	
42	📄 Sales/Order Report	👤 Sylvester Zwavhudi Netswi...	🟡 New	Mining Order Operation Mana...	2	10/22/2025 9:22:18 AM	
39	📄 Generate payment receipts	👤 Sylvester Zwavhudi Netswi...	🟡 New	Mining Order Operation Mana...	2	10/22/2025 9:21:45 AM	
38	📄 Add invoice validation	👤 Sylvester Zwavhudi Netswi...	🟡 New	Mining Order Operation Mana...	2	10/22/2025 9:21:40 AM	
37	📄 Implement payment module	👤 Sylvester Zwavhudi Netswi...	🟡 New	Mining Order Operation Mana...	2	10/22/2025 9:21:34 AM	
53	📄 Final client demo	👤 Sylvester Zwavhudi Netswi...	🟡 New	Mining Order Operation Mana...	2	10/22/2025 9:20:35 AM	
54	📄 Handover documentation	👤 Phuti Thabiso Phaka	🟡 New	Mining Order Operation Mana...	2	10/22/2025 9:20:28 AM	
47	📄 Unit testing	👤 Sylvester Zwavhudi Netswi...	🟡 New	Mining Order Operation Mana...	2	10/22/2025 9:19:56 AM	

Azure Boards features such as boards

Mining Order Operation Management Team
83

Board
Analytics

Epics

View as backlog

New

Active
2/5

Resolved

0/5

Closed

New Item

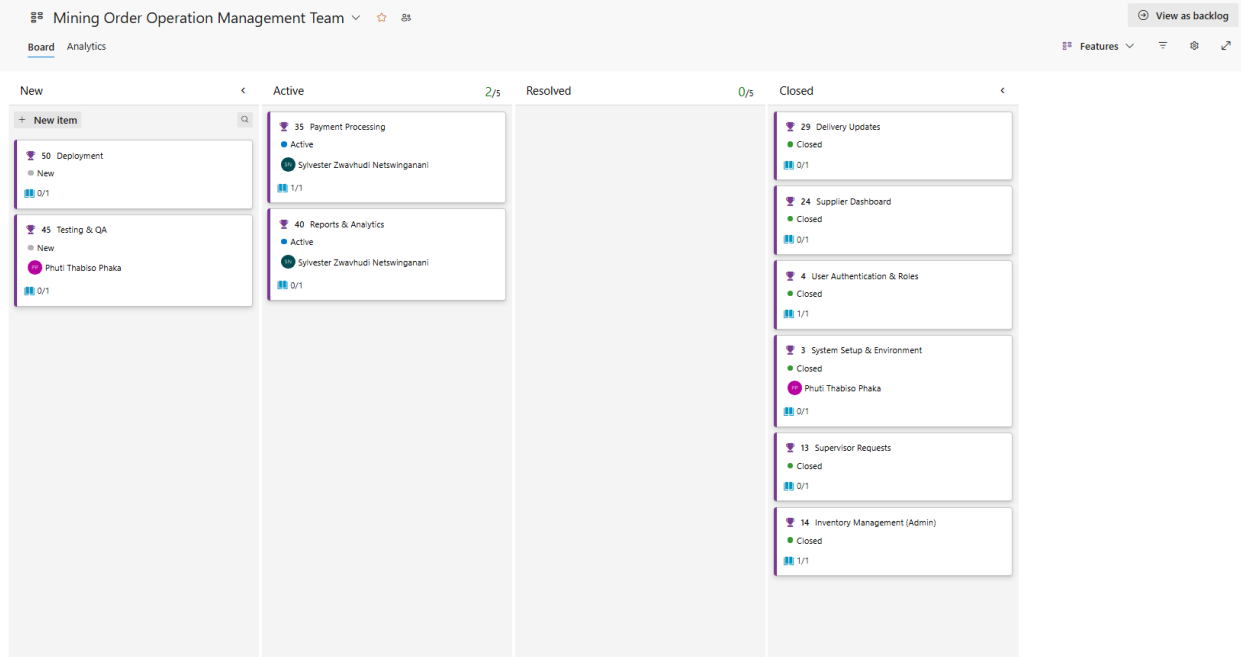
33 Payments & Reporting
New
Sylvester Zwavhudi Netswiganani
2/2

34 System Quality & Delivery
Active
Sylvester Zwavhudi Netswiganani
2/2

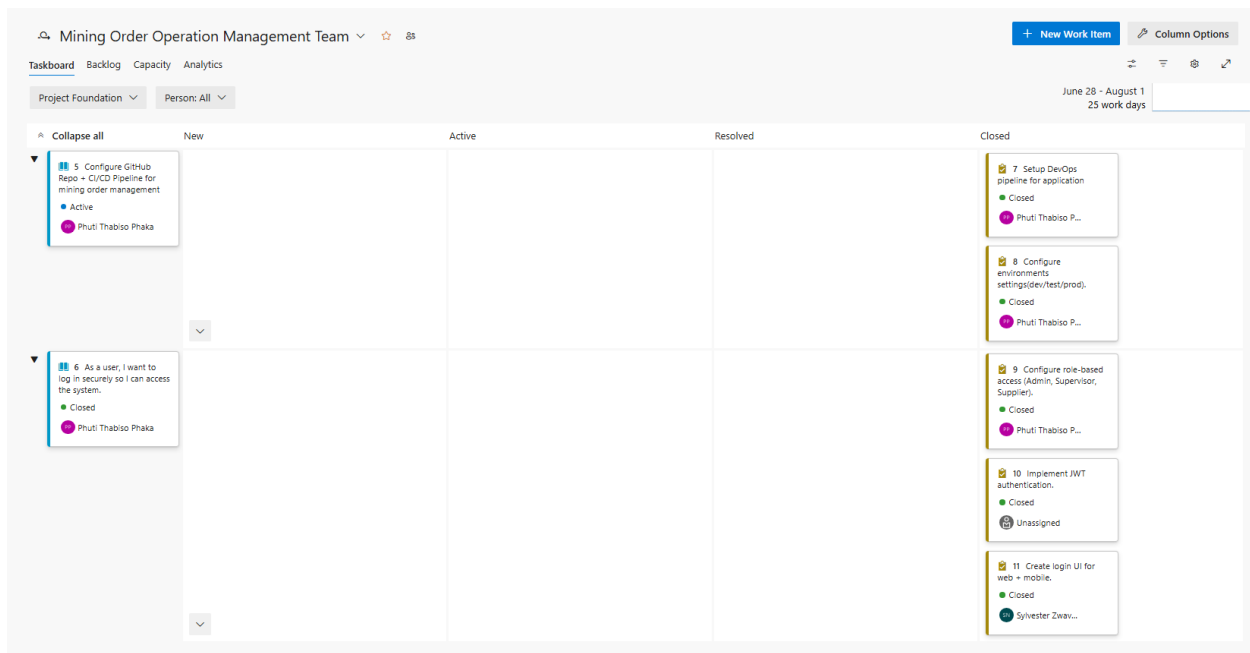
23 Supplier Management & Orders
Active
Phuti Thabiso Phaka
2/2

1 Authentication & Setup
Closed
Phuti Thabiso Phaka
2/2

12 Inventory & Material Requests
Closed
2/2



Assign user stories and tasks to sprints based on their priority and estimated effort



Supervisor Material Requests

Person: All

August 4 - August 8
5 work days

Collapse all

New

Active

Resolved

Closed

15 As a supervisor, I want to create material requests so I can order items

Resolved

Phuti Thabiso Phaka

19 Link requests to inventory stock

New

Sylvester Zwav...

18 Design Supervisor Dashboard UI

Active

Phuti Thabiso P...

17 Design Supervisor Dashboard UI

Closed

Phuti Thabiso P...

Inventory (Admin)

Person: All

August 11 - August 15
5 work days

Collapse all

New

Active

Resolved

Closed

As an admin, I want to track inventory flow so I can manage stock levels.

3 not started

30 As a supplier, I want to update delivery status so supervisors can track progress.

New

Sylvester Zwavhudi N...

32 Integrate with notifications

Active

Sylvester Zwav...

31 Create delivery status update page

Closed

Phuti Thabiso P...

Inventory (Admin)

Person: All

August 11 - August 15
5 work days

Collapse all

New

Active

Resolved

Closed

As an admin, I want to track inventory flow so I can manage stock levels.

3 not started

30 As a supplier, I want to update delivery status so supervisors can track progress.

New

Sylvester Zwavhudi N...

32 Integrate with notifications

Active

Sylvester Zwav...

31 Create delivery status update page

Closed

Phuti Thabiso P...

Taskboard

Backlog

Capacity

Analytics

Reporting Admin and Supervisor

Person: All

September 15 - September 19
5 work days

Collapse all

New

Active

Resolved

Closed

41 As an admin, I want to generate system reports so I can monitor operations.

Resolved

Phuti Thabiso Phaka

42 Sales/Order Report

Active

Sylvester Zwav...

44 Payment Report

Active

Phuti Thabiso P...

43 Inventory Report

Closed

Sylvester Zwav...

Taskboard

Backlog

Capacity

Analytics

Payment Processing

Person: All

September 29 - October 3
5 work days

Collapse all

New

Active

Resolved

Closed

36 As an admin, I want to process supplier payments so transactions are recorded

Closed

Phuti Thabiso Phaka

38 Add invoice validation

Active

Sylvester Zwav...

37 Implement payment module

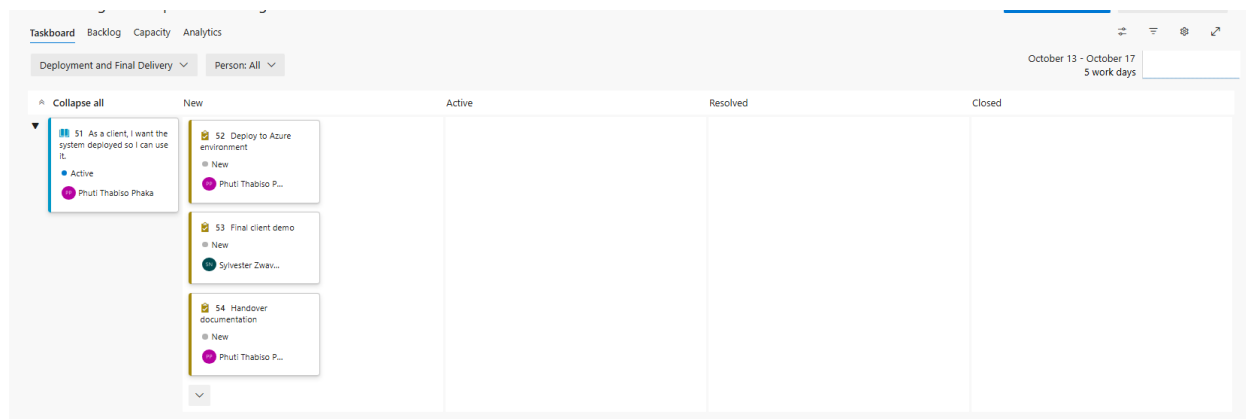
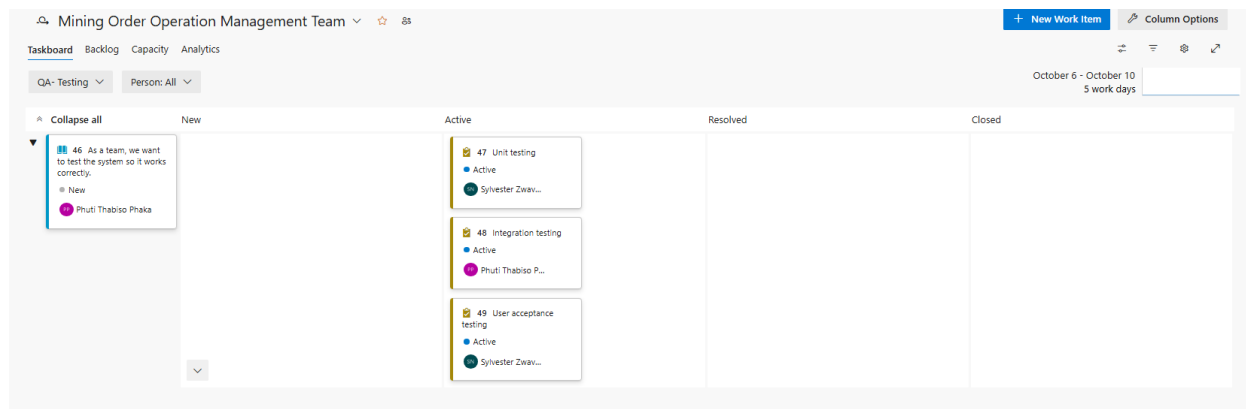
Closed

Sylvester Zwav...

39 Generate payment receipts

Closed

Sylvester Zwav...



7. Risk Management

Risk	Description	Likelihood	Impact	Mitigation Strategy
Team Member Illness	One or more members become unavailable due to illness or emergencies.	Medium	High	Use shared GitHub branches and documentation; ensure backup developer understands key modules.
Exam/Assignment Overlap	Exams and assignments reduce project time.	High	Medium	Reduce sprint scope during exam weeks; use lighter documentation tasks.
Scope Creep	Adding unplanned features mid-development.	Medium	High	Strict backlog prioritization; approval required from project manager before changes.
Data Loss / Corruption	Risk of losing project data	Low	High	Daily Git commits; backup repository on GitHub and Azure Cloud.

	due to system crashes.			
Merge Conflicts in Git	Multiple developers edit same files.	Medium	Medium	Use feature branches and pull request reviews.
Client Unavailability	Delayed feedback or unclear requirements.	Medium	High	Use mock demos; gather peer/lecturer feedback as interim validation.
Security Vulnerabilities	Incomplete input validation or missing authorization checks.	Low	High	Implement OWASP guidelines; conduct security testing.
Budget Overruns (Cloud Costs)	Azure or hosting costs exceed expectations.	Low	Medium	Use free student credits; monitor cloud usage monthly.

7. Team Roles & Responsibilities

Team Member	Role	Responsibilities
Phaka Phuti Thabiso	Project Manager / Lead Developer	Coordinates project tasks, handles backend logic, oversees GitHub repo, manages deadlines.
Sykvester Netswinganani	Frontend Developer	Designs UI with Bootstrap and Razor views; connects frontend with backend APIs.
Sykvester Netswinganani	QA / Tester	Conducts unit testing, integration testing, and verifies user flows.
Phaka Phuti Thabiso	Documentation / DevOps	Maintains project documentation, sets up CI/CD pipelines, manages Azure deployments.

8. Tools & Technologies

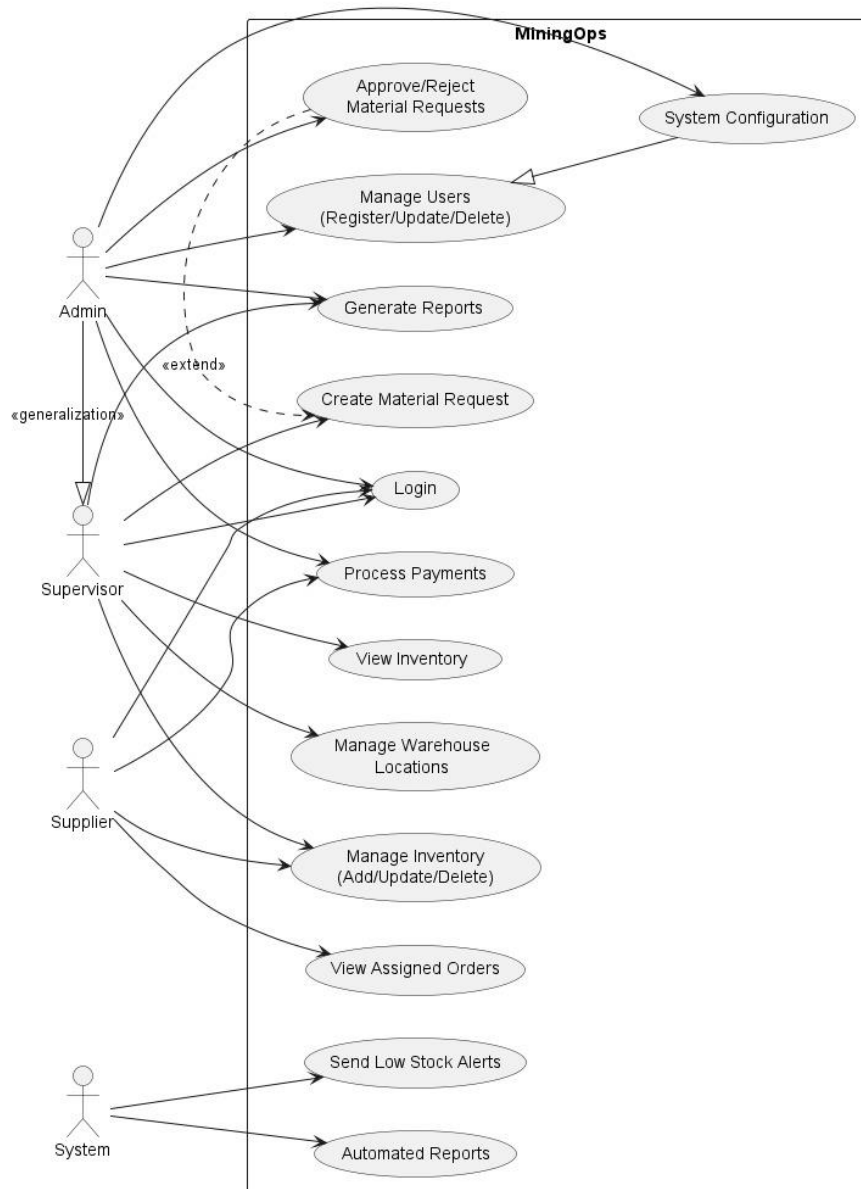
- **Backend:** ASP.NET Core MVC, Entity Framework Core
- **Frontend:** Razor Pages, Bootstrap 5, JavaScript
- **Database:** Azure SQL
- **Version Control:** GitHub with Pull Requests

- **Hosting:** Microsoft Azure
- **Project Management:** Azure Boards

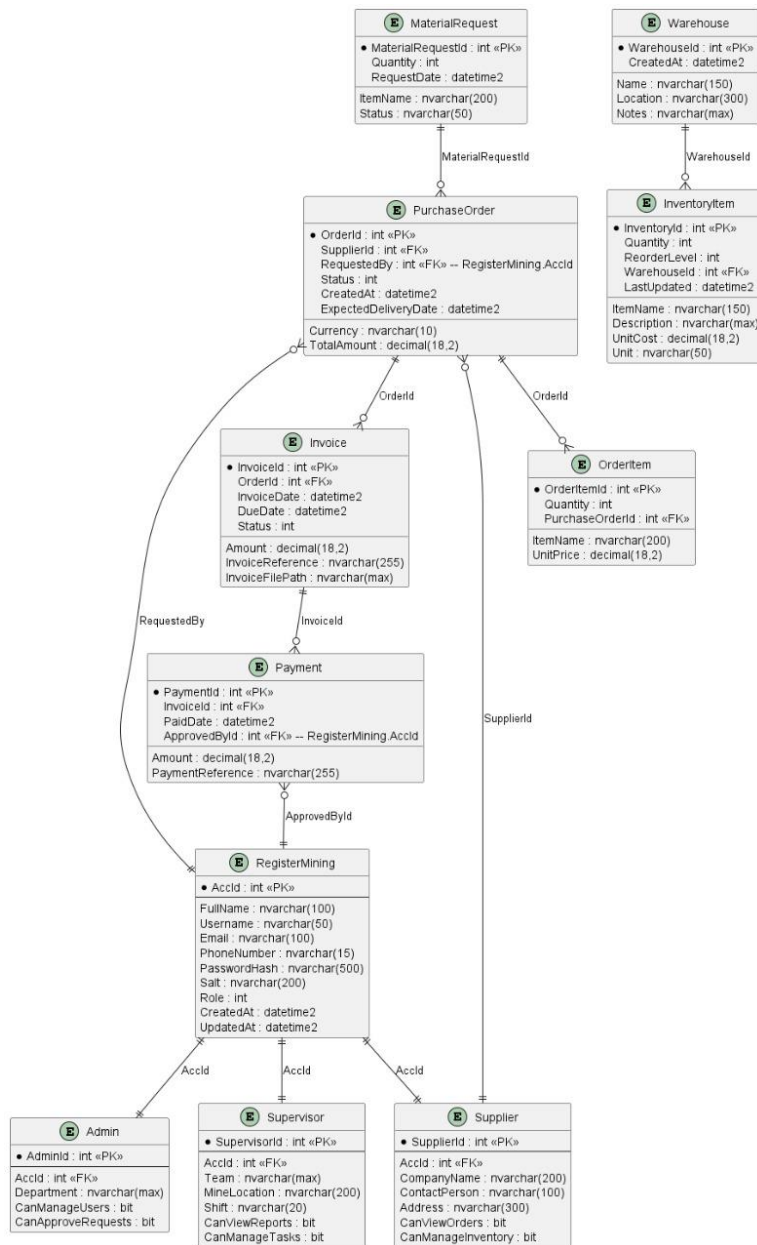
Phase 3

Designing and Developing of MOMs

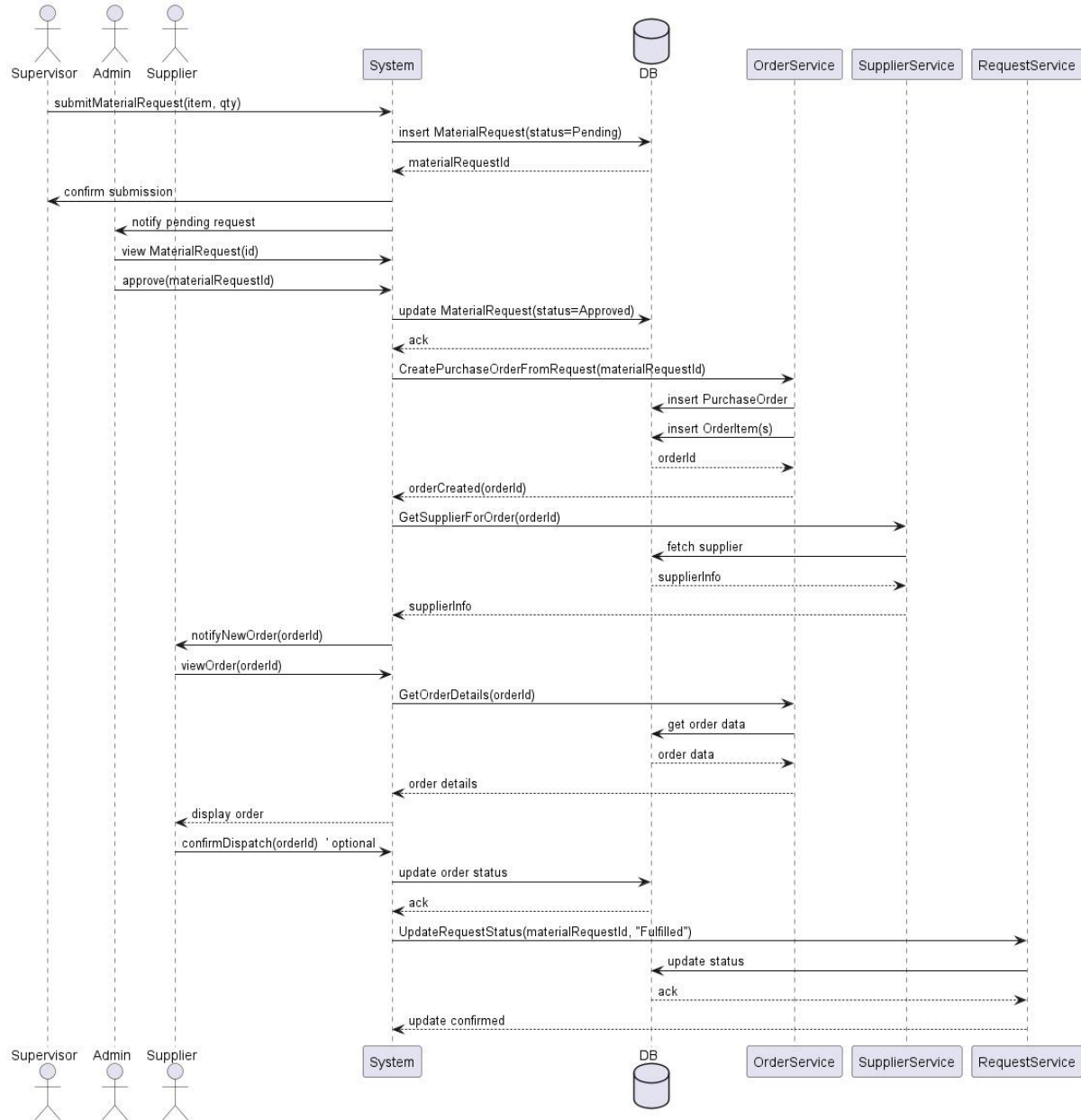
UML diagrams



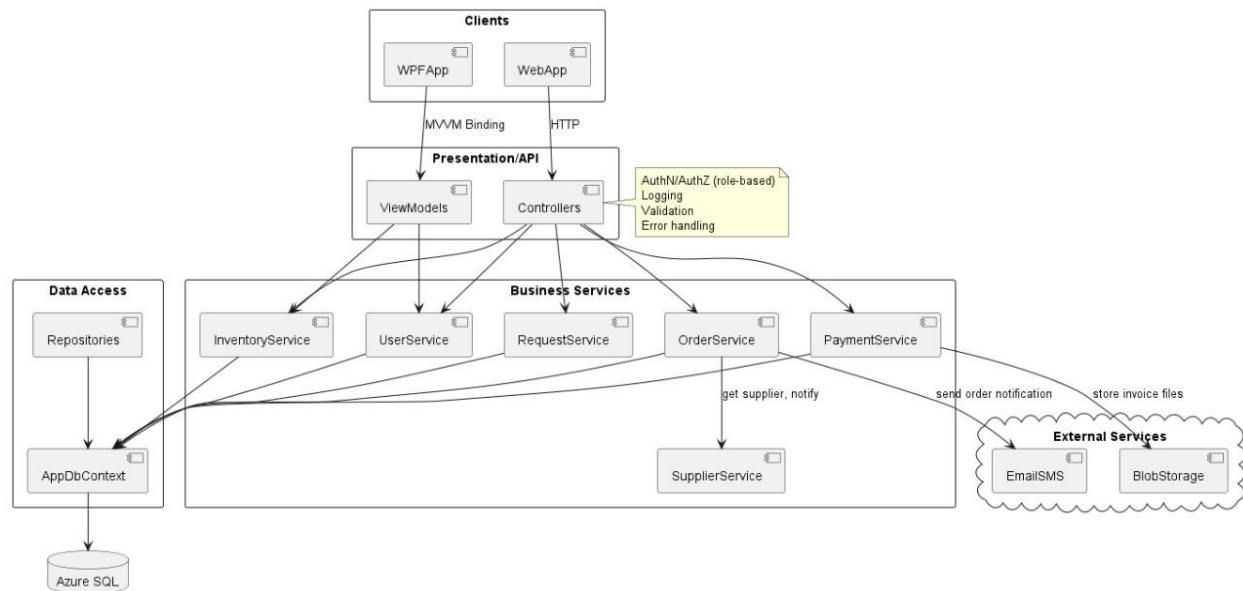
ER Diagram



Sequence diagrams



Description of the design patterns/architectural patterns used for non-functional requirements.



1. Overview

The system is built on a **layered architecture** following the **Model-View-ViewModel (MVVM)** and **Model-View-Controller (MVC)** principles.

It separates concerns into distinct layers for **Clients**, **Presentation/API**, **Business Services**, **Data Access**, and **External Services**, ensuring scalability, maintainability, and security.

2. Layered Architecture Description

A. Client Layer

- **Components:** WPFApp, WebApp
- **Function:** Provides the user interface for both desktop and web users.
- **Interaction:**
 - The **WPF client** uses **MVVM binding** for UI logic separation.
 - The **Web client** communicates via **HTTP APIs** with the backend.

B. Presentation/API Layer

- **Components:** Controllers, ViewModels
- **Responsibilities:**
 - Handles HTTP requests and responses.
 - Manages user input and output logic.
 - Includes **authentication, authorization, validation, error handling, and logging.**
- **Pattern Used:** MVC
- **Non-functional focus:** Security (role-based AuthN/AuthZ), reliability (exception handling), and reusability (controller-level services).

C. Business Services Layer

- **Components:**
 - UserService
 - RequestService
 - OrderService
 - PaymentService
 - SupplierService
 - InventoryService
- **Responsibilities:**
 - Encapsulates business logic and enforces rules for each module (Orders, Suppliers, Payments, etc.).
 - Coordinates interactions between Presentation/API and Data Access layers.
 - **Design Pattern:** *Repository + Dependency Injection* for decoupling and testability.
- **Non-functional focus:** Scalability, reusability, and reliability.

D. Data Access Layer

- **Components:** Repositories, AppDbContext
- **Responsibilities:**
 - Interacts directly with **Azure SQL (cloud-based database).**
 - Provides CRUD operations via **Entity Framework Core (EF Core).**
 - Uses **Repository Pattern** to abstract data logic from business logic.
- **Non-functional focus:** Data integrity, maintainability, and abstraction.

E. External Services Layer

- **Components:** EmailSMS, BlobStorage
- **Responsibilities:**
 - Sends real-time notifications (email/SMS) to suppliers or administrators.
 - Stores invoice files securely in **Azure Blob Storage**.
- **Non-functional focus:** Integration, scalability, and cloud reliability.

3. Design Patterns Summary

Pattern	Purpose	Implementation Example
MVC / MVVM	Separates logic, UI, and data management	Controllers + ViewModels
Repository Pattern	Abstracts database access	Repositories using EF Core
Dependency Injection	Promotes loose coupling	Injecting services into controllers
Singleton Pattern	Maintains single instance for logging/configuration	Logging & App Configuration
Observer Pattern	Sends notifications for order events	EmailSMS notification system
Factory Pattern (optional)	Creates specific service instances dynamically	Order/Payment creation logic

4. Security and Reliability

- **Role-Based Authentication & Authorization (AuthN/AuthZ):** Ensures access control for Admin, Supervisor, and Supplier roles.
- **Validation & Error Handling:** Prevents invalid input and handles exceptions gracefully.
- **Cloud Database (Azure SQL):** Ensures real-time synchronization and data persistence.
- **Secure Communication:** HTTPS used for encrypted data transfer.
- **Logging:** Activity and error logs are maintained using centralized logging services.

5. Non-Functional Benefits

Requirement	Achieved Through
Security	AuthN/AuthZ, HTTPS, input validation
Scalability	Layered design + cloud integration
Maintainability	MVC + Repository + DI patterns
Performance	Optimized EF Core queries, caching
Reliability	Error handling + logging
Usability	MVVM front-end + responsive design

Project Management Files

Github Link

[phutithabiso/MiningOps](https://github.com/phutithabiso/MiningOps)


<https://github.com/Netswinganani/MiningOps.git>

https://dev.azure.com/ST10219717/Mining%20Order%20Operation%20Management/_dashboards/dashboard/354c7f84-c549-41ba-9a58-ab66b222629f

UI/UX screenshots of the user interface. The interface must be user friendly to enable the community to navigate the system.

Interface for dashboards

YOU ARE VERY IMPORTANT. WE DRIVE TO MEET YOUR DEMAND ON TIME.



MiningOps
Operations Management System

Sign In to Your Account

Username or Email

Password

[Forgot Password](#)


[Sign In](#)

Demo Credentials


Admin: admin / admin123
Supplier: supplier1 / supplier123
Supervisor: supervisor1 / supervisor123

OUR SERVICES


MiningOps provides centralized digital platform for managing and tracking orders in mining operations services throughout the greater JHB area. From Mining supplies, Payments tracking, and warehouses inventory, our experienced workforce follows a proven methodology to get the job done on time and within budget.




WORKER GEAR




MUNICIPAL CONTRACT




SCALE GEAR




THREADED BUTTON BIT




Mining Buckets




ROCKBREAKERS



Concrete Wheelbarrow



Refurbishments



Pit Pan Shovel

MiningOps

Dashboard

User Management

Inventory

Suppliers

Requests

Orders & Procurement

Payment Processing

Notifications

Roles

Logout

Welcome, System Administrator

Admin

TOTAL USERS
3
All Registered Users

ADMINISTRATORS
1
System Administrators

SUPERVISORS
1
Operation Supervisors

SUPPLIERS
1
Vendor Suppliers

+ Add New User

Refresh Data

User Management (3 users)

ID	Username	Email	Full Name	Role	Phone	Created	Actions
1	admin	admin@miningops.com	System Administrator	Admin	555-0001	10/30/2025	<a>Edit <a>Details <a>Delete
2	supplier1	supplier1@miningops.com	Supplier One	Supplier	555-0002	10/30/2025	<a>Edit <a>Details <a>Delete
3	supervisor1	supervisor1@miningops.com	Supervisor One	Supervisor	555-0003	10/30/2025	<a>Edit <a>Details <a>Delete

MiningOps

Dashboard

User Management

Inventory

Suppliers

Requests

Orders & Procurement

Payment Processing

Notifications

Roles

Logout

Welcome, System Administrator

Admin

Dashboard Overview

Refresh

3
Total Users

3
Inventory Items

3
Suppliers

1
Pending Requests

9
Active Orders

\$331,209.00
Total Payments

\$75,341.00
Inventory Value

\$80,540.00
Outstanding Invoices

0
Overdue Invoices

3
Warehouses

16.7%
Order Completion

84.2%
Payment Approval

Low Stock Alerts

testedit

Stocks: 5 Reorder: 22

Recent Requests

test2 Qty: 55 Requested: Oct 29, 2025	Pending
test Qty: 7 Requested: Oct 25, 2025	Rejected
Copper Wire 10mm Qty: 3 Requested: Oct 17, 2025	Approved
Grinder plate Qty: 21 Requested: Oct 16, 2025	Approved
Drill Bits Qty: 5000 Requested: Oct 15, 2025	Approved

No recent requests

Recent Invoices

INV-19-20251028 Amount: \$165.00 Date: Oct 28	Unpaid
INV-16-20251028 Amount: \$30.00 Date: Oct 28	Unpaid
INV-9-20251027133705 Amount: \$511,000.00 Date: Oct 27	Sent
INV-10-20251027133806 Amount: \$270.00 Date: Oct 27	Draft
INV-15-20251026 Amount: \$3.00 Date: Oct 26	Unpaid

No recent invoices

Quick Actions

+ Create New Request

Manage Inventory

View Orders

Process Payments

User Management

MiningOps

Dashboard

User Management

Inventory

Suppliers

Requests

Orders & Procurement

Payment Processing

Notifications

Roles

Logout

Welcome, System Administrator

Admin

Inventory Management

+ Add Item

Inventory Overview

Total Items

3

across all warehouses

Total Value

\$75,341.00

current stock valuation

Low Stock Items

1

need reordering

Out of Stock

0

urgent restock needed

Low Stock Alerts

1

testedit

5 left

Quick Actions

Generate Stock Report

Refresh Data

Low Stock Report

Search

Filters

Apply Filters

Clear Filters

ID	Item Name	Description	Quantity	Unit Cost	Reorder Level	Warehouse	Last Updated	Status	Actions
1	testItem	test description	3	\$22.00	2	Fuel Depot	10/16/2025	Low Stock	<div>Edit</div> <div>Details</div> <div>Delete</div>
2	testedit	tesdeseit	5	\$55.00	22	General Materials Sto	10/16/2025	Low Stock	<div>Edit</div> <div>Details</div> <div>Delete</div>
3	Hydraulic Drill Bit	Heavy-duty drill bit used for underg	500	\$150.00	0	Open Pit Workshop C	10/21/2025	Available	<div>Edit</div> <div>Details</div> <div>Delete</div>

MiningOps

Dashboard

User Management

Inventory

Suppliers

Requests

Orders & Procurement

Payment Processing

Notifications

Roles

Logout

Welcome, System Administrator

Admin

Payment Processing Dashboard

19

Total Payments

\$80,540.00

Outstanding

\$331,209.00

Paid This Month

0

Overdue Invoices

9

Unpaid Invoices

Recent Payments

PAY-13-20251027140133

Oct 27

\$270.00

PAY-6-20251027140231

Oct 27

\$45,000.00

PAY-INV-15-20251026-214121

Oct 26

\$3.00

PAY-INV-12-20251025-213944

\$21.00

Pending Approval

PAY-INV-9-20251025-202133

\$45,000.00

Approve

PAY-INV-9-20251025-211621

\$45,000.00

Approve

PAY-13-20251027140133

\$270.00

Approve

Payment Processing

+ Process Payment

Quick Stats: Outstanding: \$80,540.00 Monthly Payments: \$331,209.00 Overdue: 0

Search

Refresh

Export

Payment ID	Invoice Ref	Amount	Paid Date	Payment Ref	Approved By	Supplier	Actions
1		\$35,000.00	10/25/2025	PAY-INV-8-20251025-2117			<div>Details</div> <div>Approve</div>
2		\$35,000.00	10/25/2025	PAY-INV-8-20251025-2117			<div>Details</div> <div>Approve</div>
3		\$21.00	10/25/2025	PAY-INV-12-20251025-212			<div>Details</div> <div>Approve</div>
4		\$45,000.00	10/25/2025	PAY-INV-9-20251025-2122			<div>Details</div> <div>Approve</div>
5		\$270.00	10/25/2025	PAY-INV-10-20251025-213			<div>Details</div> <div>Approve</div>
6		\$35,000.00	10/26/2025	PAY-INV-8-20251025-1937			<div>Details</div> <div>Approve</div>
7		\$45,000.00	10/26/2025	PAY-INV-9-20251025-2020			<div>Details</div> <div>Approve</div>

Dashboard

User Management

Inventory

Suppliers

Requests

Orders & Procurement

Payment Processing

Notifications

Roles

Logout

Welcome, System Administrator

Admin

Order Management Dashboard

12
Total Orders

2
Pending

6
Confirmed

1
Dispatched

2
Completed

\$230,661.00
Total Value

Top Suppliers

HardwareOps (6)
hack Truck (4)
New Supplier (2)

Recent Orders

HardwareOps
Oct 28
\$165.00
Cancelled

HardwareOps
Oct 27
\$10,021.00
Cancelled

HardwareOps
Oct 27
\$100,000.00
Ordered

HardwareOps
\$30.00

Order Management

+ Create Order

Search

Refresh

Order ID	Supplier	Requester	Total Amount	Status	Created	Expected Delivery	Actions
8	New Supplier	Phuti Thabiso Phaka	\$35,000.00	Dispatched	10/25/2025	10/27/2025	Details Edit Update Status Delete
9	hack Truck	Phuti Thabiso Phaka	\$45,000.00	Completed	10/25/2025	11/08/2025	Details Edit Update Status Delete
10	hack Truck	Phuti Thabiso Phaka	\$270.00	Cancelled	10/25/2025	11/07/2025	Details Edit Update Status Delete
11	HardwareOps	Phuti Thabiso Phaka	\$21.00	Completed	10/25/2025	11/15/2025	Details Edit Update Status Delete
12	hack Truck	Phuti Thabiso Phaka	\$21.00	Confirmed	10/25/2025	11/14/2025	Details Edit Update Status Delete
13	HardwareOps	Phuti Thabiso Phaka	\$30.00	Confirmed	10/25/2025	11/08/2025	Details Edit Update Status Delete
14	hack Truck	Phuti Thabiso Phaka	\$100.00	Confirmed	10/25/2025	10/27/2025	Details Edit Update Status Delete
15	New Supplier	Phuti Thabiso Phaka	\$3.00	Confirmed	10/26/2025	10/28/2025	Details Edit Update Status Delete
16	HardwareOps	Phuti Thabiso Phaka	\$20.00	Confirmed	10/27/2025	10/27/2025	Details Edit Update Status Delete

Welcome, System Administrator

Admin

TOTAL USERS
3
All Registered Users

ADMINISTRATORS
1
System Administrators

SUPERVISORS
1
Operation Supervisors

SUPPLIERS
1
Vendor Suppliers

+ Add New User

Refresh Data

User Management

(3 users)

ID	Username	Email	Full Name	Role	Phone	Created	Actions
1	admin	admin@miningops.com	System Administrator	Admin	555-0001	10/30/2025	Edit Details Delete
2	supplier1	supplier1@miningops.com	Supplier One	Supplier	555-0002	10/30/2025	Edit Details Delete
3	supervisor1	supervisor1@miningops.com	Supervisor One	Supervisor	555-0003	10/30/2025	Edit Details Delete

MiningOps

Dashboard

User Management

Inventory

Suppliers

Requests

Orders & Procurement

Payment Processing

Notifications

Roles

Logout

Welcome, System Administrator

Admin

Back

Notifications

Refresh

Total: 3

Unread: 2

Read: 1

Apply Filters

New Material Request

Supervisor John submitted a new material request for mining equipment.

Oct 30, 2025 03:16 PM • Unread

Mark Read Delete

Payment Received

Payment of \$5,000 received from Municipal Corp for invoice #INV-2024-001

Oct 30, 2025 02:16 PM • Unread

Mark Read Delete

System Maintenance

Scheduled system maintenance this weekend from 10 PM to 2 AM

Oct 29, 2025 04:16 PM • Read

Delete

Mark All as Read

Clear All

Welcome, System Administrator

Admin

Supplier Management

Add Supplier

Supplier Overview

Total Suppliers

3

registered vendors

Active Suppliers

3

currently active

Total Orders

12

all-time orders

Pending Orders

8

awaiting fulfillment

Quick Actions

Supplier Report

Refresh Data

Contact List

Recent Suppliers 3

New Supplier

Lethabo

hack Truck

072 274 9050

HardwareOps

Henry

Supplier Performance

Top Supplier

HardwareOps

Avg Response

2.3 days

Completion Rate

94%

Search

Refresh

ID	Company Name	Contact Person	Email	Phone	Address	Actions
1	New Supplier	Lethabo	lethabo@gmail.com	0730719062	Default Address	<div>Edit</div> <div>Delete</div>
2	hack Truck	072 274 9050	onele@gmail.com	0790820314	9 Sports Road, Slaterville, Benoni 15	<div>Edit</div> <div>Delete</div>
5	HardwareOps	Henry	phuthabiso4@gmail.com	0730719062	22 Queens Street, Kensington Jhb	<div>Edit</div> <div>Delete</div>

MiningOps

Dashboard

User Management

Inventory

Suppliers

Requests

Orders & Procurement

Payment Processing

Notifications

Roles

Logout

Welcome, System Administrator

Admin

Material Request Management

+ New Request

Request Overview

Total Requests

5

all material requests

Pending Approval

1

awaiting review

Approved

3

ready for ordering

Rejected

1

not approved

Approval Rate

75%

success rate

Quick Actions

Request Report

Refresh Data

Bulk Approve

Pending Report

Urgent Requests

test2

55 needed

Request Statistics

Avg Processing
1.2 days

Top Item
Drill Bits

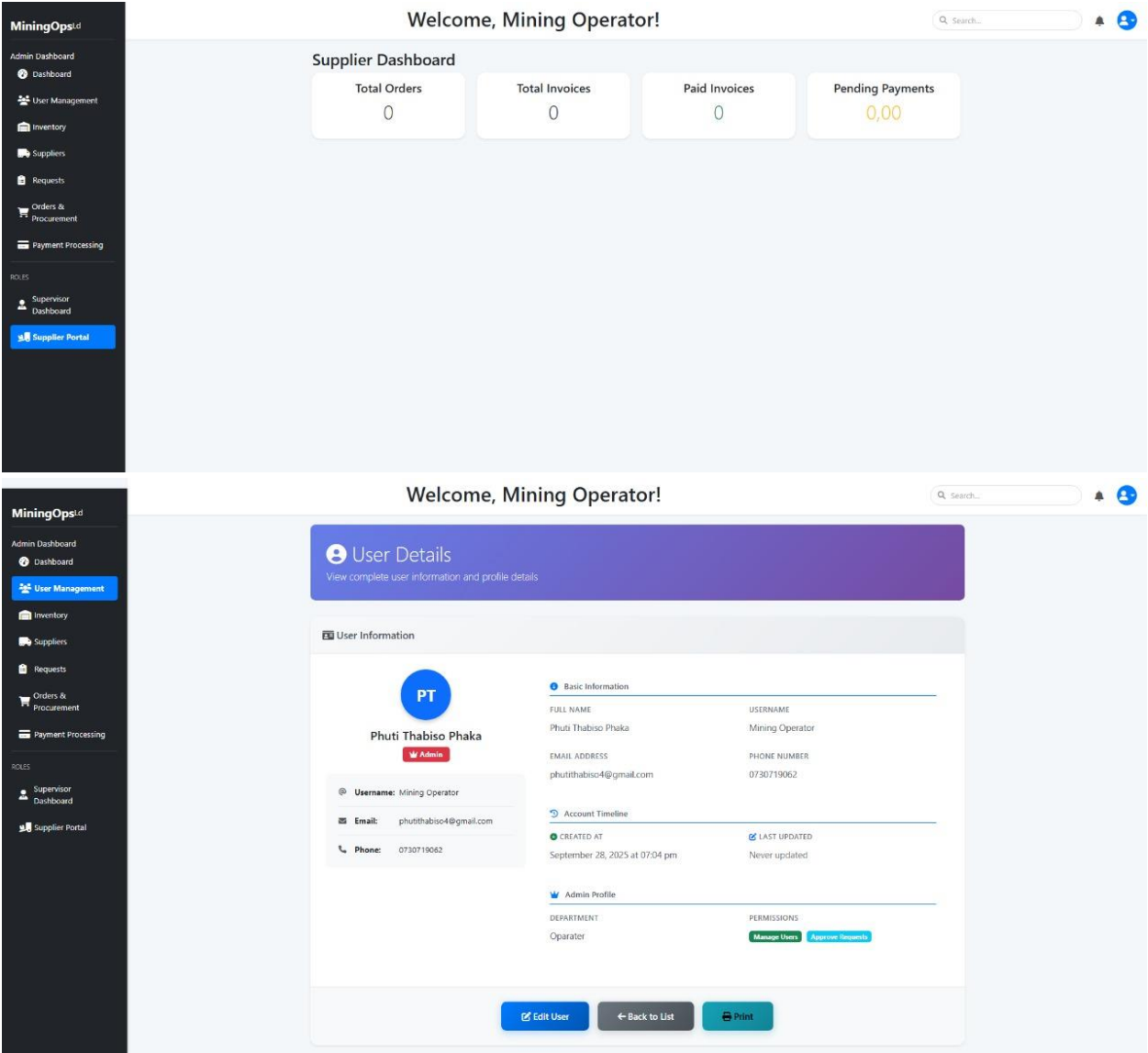
This Week
2 requests

Search

Refresh

ID	Item Name	Quantity	Status	Request Date	Time Since	Actions	
1	Drill Bits	5000	Approved	10/15/2025	16 days ago	<div>EditApproveRejectDelete</div>	
2	Copper Wire 10mm	3	Approved	10/17/2025	14 days ago	<div>EditApproveRejectDelete</div>	
3	Grinder plate	21	Approved	10/16/2025	14 days ago	<div>EditApproveRejectDelete</div>	
4	test	7	Rejected	10/25/2025	5 days ago	<div>EditApproveRejectDelete</div>	
5	test2	55	Pending	10/29/2025	2 days ago	<div>EditApproveRejectDelete</div>	

Interphase for Mobile App using Tablet



0TOTAL PAYMENTS

\$331 209,00TOTAL AMOUNT

0TODAY'S PAYMENTS

1CURRENT PAGE

INVOICE	PAYMENT DATE	AMOUNT	APPROVED BY	REFERENCE	ACTIONS
10006	Oct 25, 2025	\$35000,00	phutthabisc4@gmail.com	PAY-INV-9-20251025-211719	<div></div>
10008	Oct 25, 2025	\$35000,00	phutthabisc4@gmail.com	PAY-INV-8-20251025-211735	<div></div>
10010	Oct 25, 2025	\$21,00	phutthabisc4@gmail.com	PAY-INV-12-20251025-212247	<div></div>
10006	Oct 25, 2025	\$45000,00	phutthabisc4@gmail.com	PAY-INV-9-20251025-212256	<div></div>
10007	Oct 25, 2025	\$270,00	phutthabisc4@gmail.com	PAY-INV-10-20251025-213405	<div></div>
10005	Oct 26, 2025	\$35000,00	phutthabisc4@gmail.com	PAY-INV-8-20251026-193756	<div></div>
10006	Oct 26, 2025	\$45000,00	phutthabisc4@gmail.com	PAY-INV-9-20251026-202045	<div></div>
10007	Oct 26, 2025	\$270,00	phutthabisc4@gmail.com	PAY-INV-10-20251026-202113	<div></div>
10007	Oct 26, 2025	\$270,00	phutthabisc4@gmail.com	PAY-INV-10-20251026-202124	<div></div>
10006	Oct 26, 2025	\$45000,00		PAY-INV-9-20251026-202133	<div></div>
10006	Oct 26, 2025	\$45000,00		PAY-INV-9-20251026-211421	<div></div>
10010	Oct 26, 2025	\$21,00	phutthabisc4@gmail.com	PAY-INV-12-20251026-211634	<div></div>
10008	Oct 26, 2025	\$21,00	phutthabisc4@gmail.com	PAY-INV-12-20251026-212930	<div></div>
10008	Oct 26, 2025	\$21,00	phutthabisc4@gmail.com	PAY-INV-12-20251026-212947	<div></div>
10010	Oct 26, 2025	\$21,00	phutthabisc4@gmail.com	PAY-INV-12-20251026-213125	<div></div>
10010	Oct 26, 2025	\$21,00	phutthabisc4@gmail.com	PAY-INV-12-20251026-213944	<div></div>
10011	Oct 26, 2025	\$3,00	phutthabisc4@gmail.com	PAY-INV-15-20251026-214121	<div></div>
10012	Oct 27, 2025	\$270,00		PAY-13-20251027140333	<div></div>
10004	Oct 27, 2025	\$45000,00	lethabco@gmail.com	PAY-6-20251027140331	<div></div>

Showing 1 to 0 of 0 entries

MiningOps.id

Admin Dashboard

Dashboard

User Management

Inventory

Suppliers

Requests

Orders & Procurement

Payment Processing

ROLES

Supervisor Dashboard

Supplier Portal

Complete Supplier Profile

CompanyName

ContactPerson

Address

CanViewOrders

CanManageInventory

Save Profile

Cancel

MiningOps.id

Admin Dashboard

Dashboard

User Management

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Orders & Procurement

Payment Processing

ROLES

Supervisor Dashboard

Supplier Portal

MiningOps*.id*

Admin Dashboard

Dashboard

User Management

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Suppliers

Requests

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Payment Processing

ROLES

Supervisor Dashboard

Supplier Portal

MiningOps*.id*

Admin Dashboard

Dashboard

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Requests

Orders & Procurement

Payment Processing

ROLES

Supervisor Dashboard

Supplier Portal

Welcome, Mining Operator!

Search...

Create Supplier Contract

Establish a new contractual agreement with a supplier

Contract Details

Supplier

-- Select Supplier --

Start Date

yyyy/mm/dd

Payment Terms

-- Select Payment Terms --

End Date

yyyy/mm/dd

Contract Duration

0 days

Total contract period

Set start and end dates

Contract Terms & Conditions

Enter detailed contract terms, conditions, deliverables, and obligations...

Tip: Include scope of work, deliverables, quality standards, confidentiality clauses, and termination conditions.

Contract Value (Optional)

\$ 0.00

Contract Type

-- Select Contract Type --

Quick Templates

Standard Terms

Confidentiality

Delivery Terms

Quality Standards

Create Contract

Cancel

Preview

Contract Creation Guidelines

Best Practices

- Clearly define scope of work and deliverables
- Specify payment terms and schedules
- Include quality standards and acceptance criteria
- Define confidentiality and IP protection clauses
- Specify termination conditions and notice periods

Legal Considerations

- Ensure all terms comply with local regulations
- Include dispute resolution mechanisms
- Specify governing law and jurisdiction
- Include liability and indemnification clauses
- Define force majeure conditions

Create Inventory Item

Add new items to your warehouse inventory

New Information

Item Name *

Enter item name

Quantity *

Enter quantity

Description

Enter item description...

Unit Cost *

\$ 0.00

Warehouse

-- Select Warehouse --

Reorder Level

0

Alert when stock reaches this level

Unit

-- Select Unit --

Last Updated

2025/10/30 20:55

Leave empty to use current date and time

Financial Summary

Total Value: \$0.00

Calculated: Quantity x Unit Cost

Stock Status

Out of Stock

Based on quantity and reorder level

Create Inventory Item

Back to List

Reset Form

MinigOps*.id*

Admin Dashboard

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Orders & Procurement

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Supervisor Dashboard

Supplier Portal

Welcome, Mining Operator!

Search...

Order Items

Manage all order items and their details

Order Items List

Create New

ITEM NAME	QUANTITY	UNIT PRICE	TOTAL PRICE	PURCHASE ORDER	ACTIONS
Drill Bits	2000	\$7,00	\$35 000,00	PO#	<div></div> <div></div> <div></div>
Drill Bits	5000	\$8,00	\$40 000,00	PO#	<div></div> <div></div> <div></div>
Copper Wire 10mm	3	\$90,00	\$270,00	PO#	<div></div> <div></div> <div></div>
Grinder plate	21	\$1,00	\$21,00	PO#	<div></div> <div></div> <div></div>
Copper Wire 10mm	3	\$10,00	\$30,00	PO#	<div></div> <div></div> <div></div>
Diesel	22	\$500,00	\$11 000,00	PO#	<div></div> <div></div> <div></div>
Copper Wire 10mm	3	\$1,00	\$3,00	PO#	<div></div> <div></div> <div></div>
Copper Wire 10mm	3	\$10,00	\$30,00	PO#	<div></div> <div></div> <div></div>
Drill Bits	2000	\$20,00	\$100 000,00	PO#	<div></div> <div></div> <div></div>
Drill Bits	5000	\$10,00	\$50 000,00	PO#	<div></div> <div></div> <div></div>
Grinder plate	21	\$1,00	\$21,00	PO#	<div></div> <div></div> <div></div>
Copper Wire 10mm	3	\$55,00	\$165,00	PO#	<div></div> <div></div> <div></div>

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Admin Dashboard

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Welcome, Mining Operator!

Search...

Supplier Dashboard

Complete overview of supplier performance and contracts

New Contract

Add Performance

Quick Actions:

All Suppliers

All Contracts

All Performance

Export Report

3

Total Suppliers

0

Active Contracts

0

Expiring Soon

3,0

Avg Quality

5 900,0%

Avg Delivery

0

Active Suppliers

Supplier Summary

SUPPLIER	STATUS	CONTRACTS	EXPIRING	QUALITY RATING	DELIVERY RATE	PERFORMANCE	ACTIONS
New Supplier New Supplier	Inactive	0 active	0	0,0	00%	Needs Improvement	<div></div> <div></div> <div></div> <div></div>
hack Truck 012 214 9050 hack Truck	Inactive	0 active	0	5,0	3 100%	Excellent	<div></div> <div></div> <div></div> <div></div>
HardwareOps Henry HardwareOps	Inactive	0 active	0	4,0	3 000%	Excellent	<div></div> <div></div> <div></div> <div></div>

Showing 3 suppliers • 0 active contracts • 0 expiring soon

Last updated: Oct 30, 2025 20:45

Quick Contracts

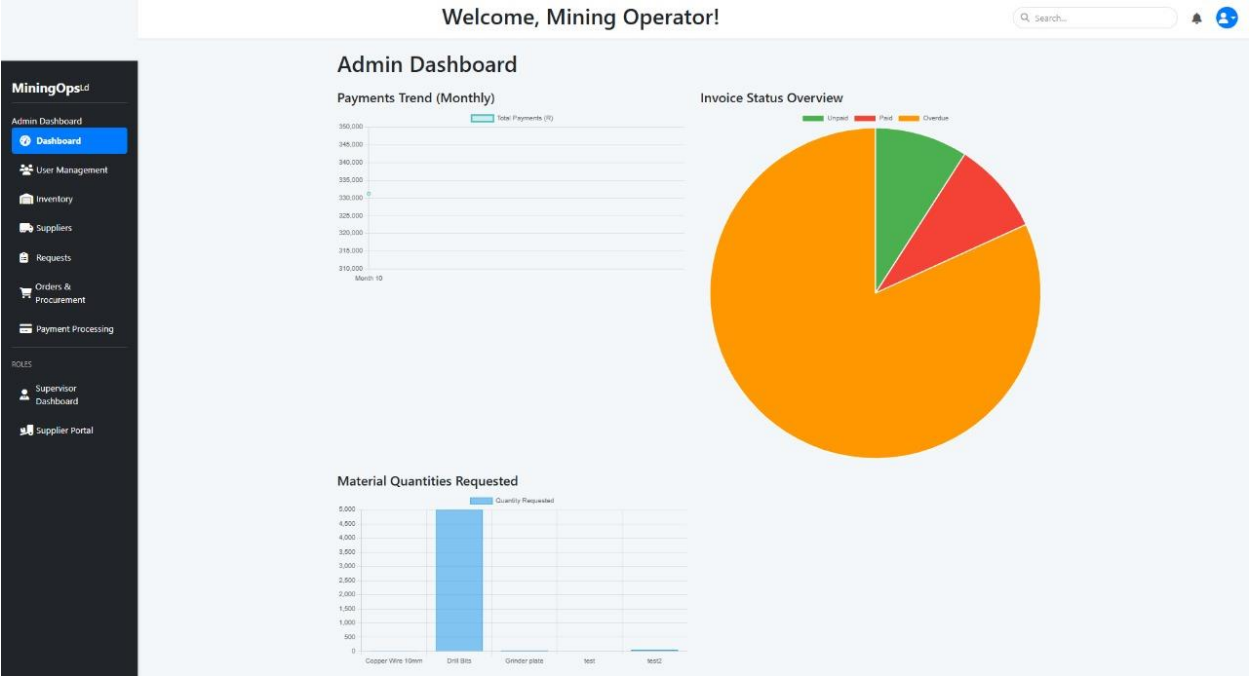
Create New Contract

View All Contracts

Performance Tracking

Add Performance Record

View All Performance



MiningsOps Ltd

Admin Dashboard

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ROLES

Supervisor Dashboard

Supplier Portal

ANALYTICS

Minerals Reports

Analytics

Compliance

Welcome, Mining Operator!

Search...

User Management

Create New User

Full Name	Username	Email	Phone Number	Role	Profile Details	Created At	Updated At	Actions
Phuti Thabiso Phaka	Mining Operator	phutithabiso4@gmail.com	0730719062	Admin	Department: Operator Can Manage Users: True Can Approve Requests: True	2025-09-28 19:04	-	<div>Edit</div> <div>Details</div> <div>Delete</div>
Phuti Thabiso Phaka	Mining Operator	phutithabiso4@gmail.com	0730719062	Admin	Profile Incomplete	2025-09-28 19:04	-	<div>Edit</div> <div>Details</div> <div>Delete</div>
Lethabo	lethabo@	lethabo@gmail.com	0730719062	Supplier	Company: New Supplier Contact: Lethabo Address: Default Address Can View Orders: True Can Manage Inventory: False	2025-10-09 20:59	-	<div>Edit</div> <div>Details</div> <div>Delete</div>
Onela Nyamisa	onela	onela@gmail.com	0790820314	Supplier	Company: hack Truck Contact: 072 274 9050 Address: 9 Sports Road, Slaterville, Benoni 1512 Can View Orders: True Can Manage Inventory: False	2025-10-12 16:32	-	<div>Edit</div> <div>Details</div> <div>Delete</div>
Kali Smith	Kali	miningsops@gmail.com	0730719062	Supplier	Profile Incomplete	2025-10-17 09:24	-	<div>Edit</div> <div>Details</div> <div>Delete</div>

MiningsOps Ltd

Admin Dashboard

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Supervisor Dashboard

Supplier Portal

Inventory Management

Manage and track all inventory items across warehouses

Manage Warehouses

Filters & Search

Search Items

Warehouse

Category

Stock Status

Apply Filters

Search item name or describe

All Warehouses

All Categories

All Status

Clear Filters

3

Total Items

R75 341,00

Total Value

1

Low Stock

0

Out of Stock

All Items (3)

In Stock (2)

Low Stock (1)

Out of Stock (0)

Inventory Items

Showing 3 of 3 items

Add New Item

ITEM NAME	DESCRIPTION	QUANTITY	UNIT COST	WAREHOUSE	LAST UPDATED	ACTIONS
Hydraulic Drill Bit	Heavy-duty drill bit used f...	500	R150,00	Open Pit Workshop Depot	Oct 21, 2025 09:06	<div></div> <div></div> <div></div>
testedit	testdescript	5	R55,00	General Materials Storage	Oct 16, 2025 23:41	<div></div> <div></div> <div></div>
testitem	test description	3	R22,00	Fuel Depot	Oct 16, 2025 23:32	<div></div> <div></div> <div></div>

MiningOps Ltd

Admin Dashboard

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Suppliers

Requests

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ROLES

Supervisor Dashboard

Supplier Portal

Welcome, Mining Operator!

Search...

Supplier Contracts

Manage all supplier contracts and agreements

Create New Contract

1

Total Contracts

0

Active

0

Expiring Soon

1

Expired

0

Ongoing

R0.00

Total Value

Contract Overview

Supplier	Contract Type	Contract Terms	Payment Terms	Start Date	End Date	Contract Value	Status	Days Left	Actions
hack Truck 072 274 9090	unknown	Confidentiality: The Supplier shall not disclose a...	Net 30	Oct 17, 2025 ?? - ??	Oct 24, 2025	\$0.00	Expired	Expired	<div></div> <div></div> <div></div>

Showing 1 contracts • 0 active • 0 expiring soon

Last updated: Oct 30, 2025 20:47

Quick Filters:

All Contracts (1)

Active (0)

Expiring Soon (0)

Expired (1)

Ongoing (0)

MiningOps Ltd

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Supervisor Dashboard

Supplier Portal

Welcome, Mining Operator!

Search...

Supplier Performance

Track and manage supplier performance metrics

Add Performance Record

Performance Overview

2 Records

Supplier	Report Date	On-Time Delivery	Quality Rating	Compliance Score	Performance Score	Rating	Actions
HardwareOps Henry	Oct 21, 2025	9 000%	4.0	90.0	95.0	Excellent	<div></div> <div></div> <div></div>
hack Truck 072 274 9090	Oct 21, 2025	8 700%	5.0	98.0	98.0	Excellent	<div></div> <div></div> <div></div>

8 850,0%
Avg. Delivery Rate

4,5
Avg. Quality Rating

75,0
Avg. Compliance

56,0
Overall Score

MiningOps Ltd

Admin Dashboard

Dashboard

User Management

Inventory

Suppliers

Requests

Orders & Procurement

Payment Processing

ROLES

Supervisor Dashboard

Supplier Portal

Welcome, Mining Operator!

Search...

Warehouse Management

Manage all warehouse locations and inventory storage

Manage Inventory

3

Total Warehouses

3

Active

0

Total Items

100%

Capacity

Search warehouses...

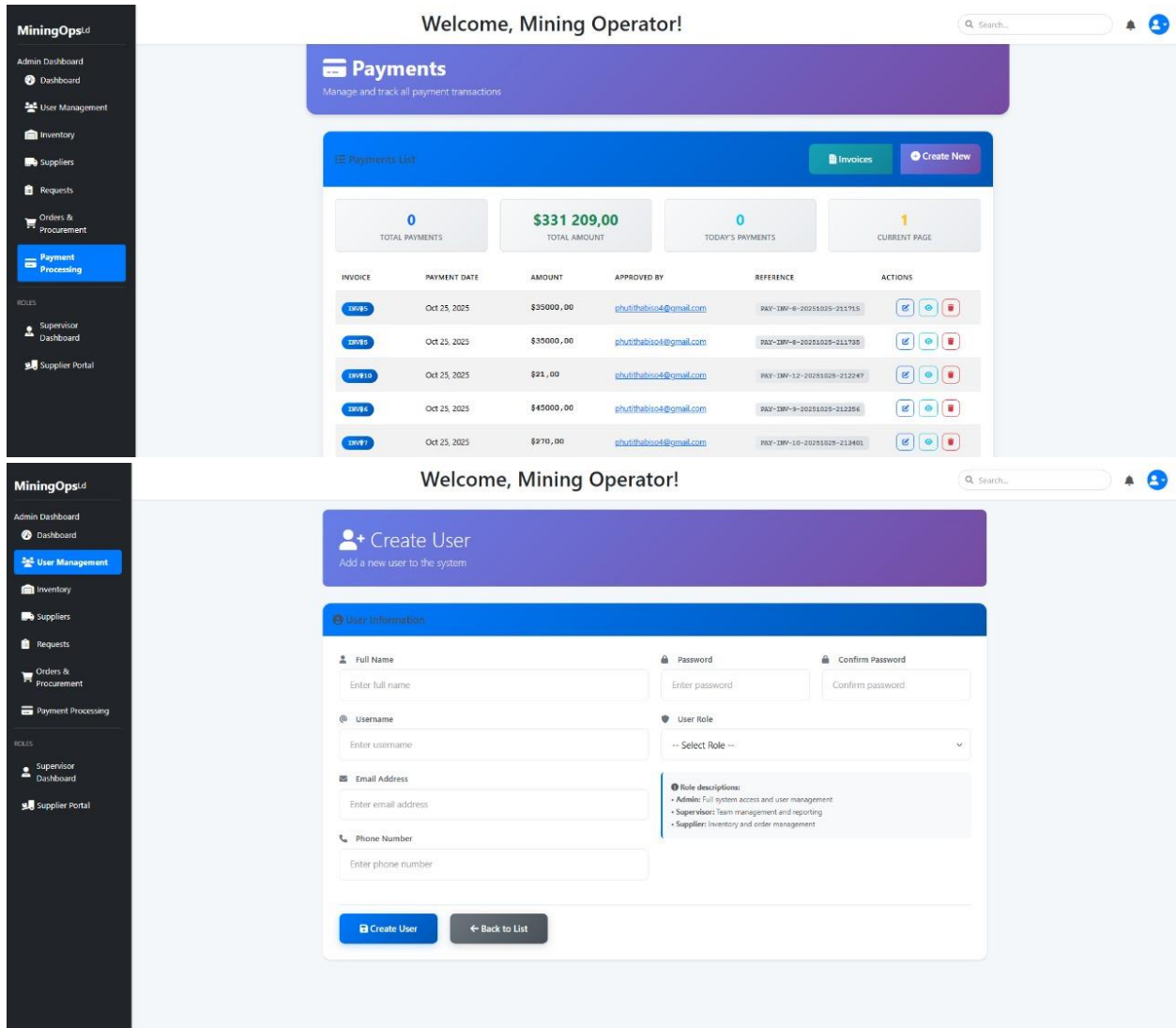
Create New Warehouse

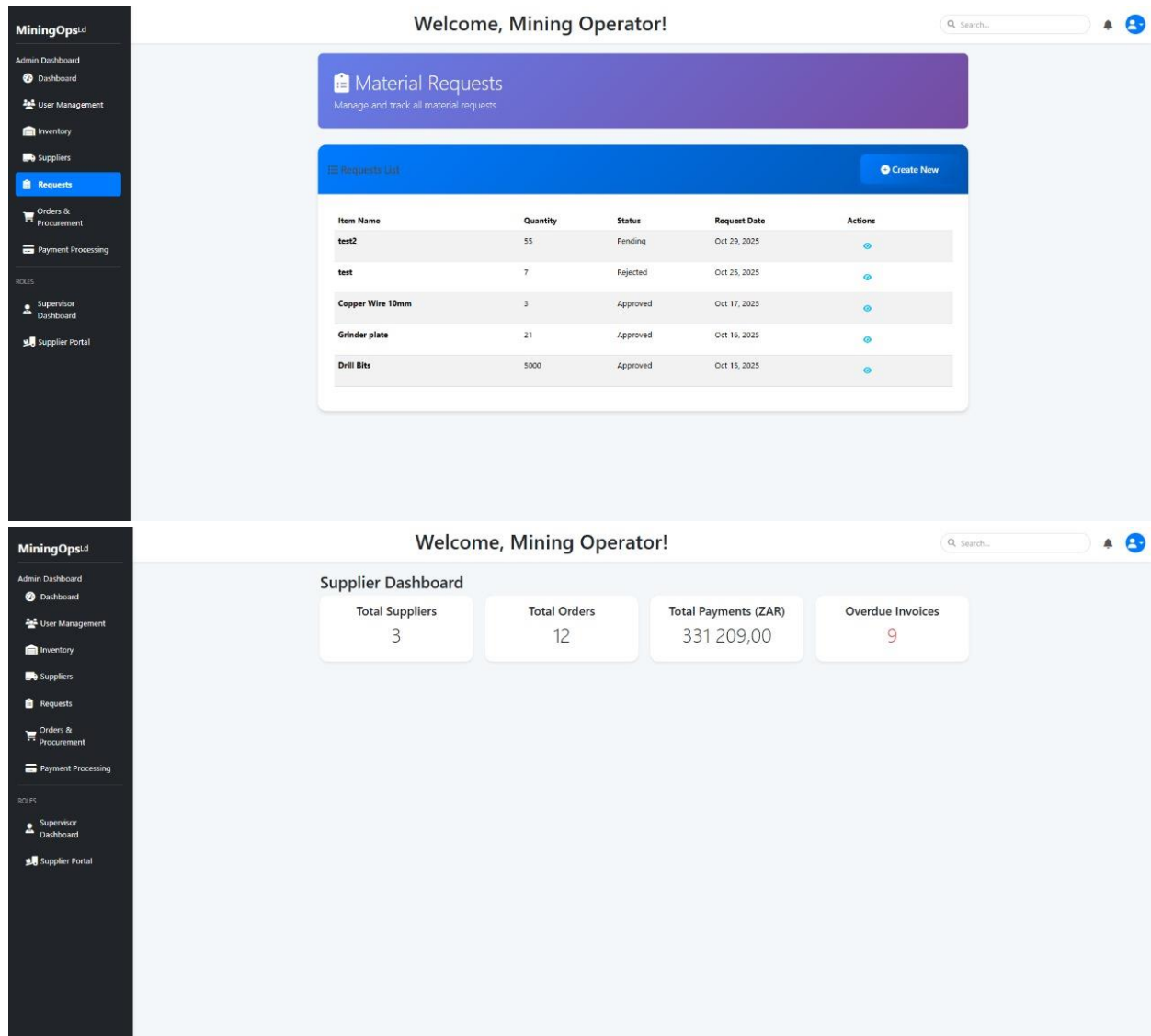
Warehouse List

WAREHOUSE NAME	LOCATION	NOTES	CREATED DATE	ACTIONS
Open Pit Workshop Depot ID: 1	Near Diesel Refueling Station (OP-WRK-01)	Stores parts for heavy mini...	Oct 01, 2025 12:45 pm	<div></div> <div></div> <div></div>
Fuel Depot ID: 2	Mine Site B - South Yard	Diesel and petrol storage. ...	Oct 16, 2025 07:22 pm	<div></div> <div></div> <div></div>
General Materials Storage ID: 3	For non-critical materials like hoses, ropes, and timber.	For non-critical materials li...	Oct 16, 2025 09:05 pm	<div></div> <div></div> <div></div>

Showing 3 warehouses

Previous1Next





Cloud-Based Database & Security Implementation

1. Cloud-Based Database

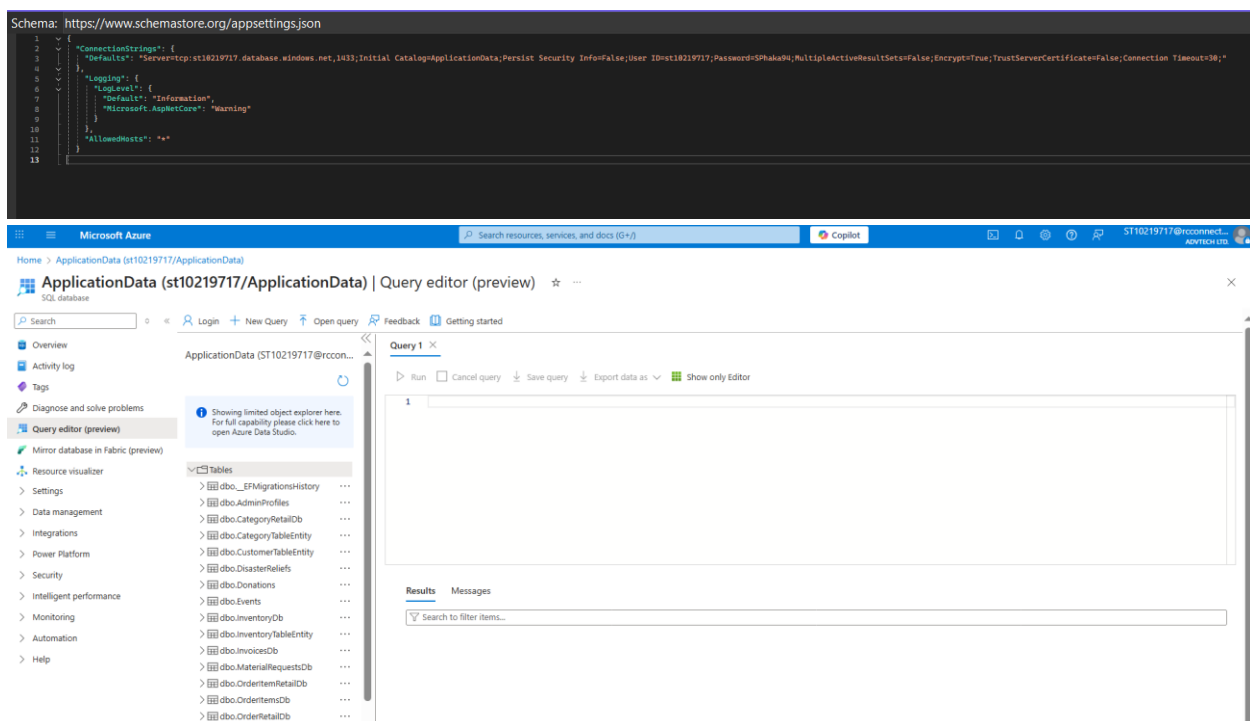
Database Service

- **Platform:** Microsoft **Azure SQL Database**
- **Purpose:** To store all system data securely and provide real-time access to users from different mining sites.

- **Reason for Choice:** Azure SQL offers **automatic backups, high availability, and scalability**, which makes it ideal for enterprise-level systems used by NGOs or remote organizations like Khula Mining Corporation.

Integration Architecture

- The MOMS system connects to **Azure SQL** through **Entity Framework Core (EF Core)** using a secure connection string.
- The AppDbContext class manages all database operations including CRUD actions for orders, users, suppliers, and invoices.



2. Secure System for Data Integrity

Data integrity and system security are maintained through a combination of **authentication, authorization, encryption, and validation mechanisms**.

Authentication

The system implements **Cookie-based Authentication** using ASP.NET Core's authentication middleware:

Code for Cookie-based Authentication

```
builder.Services.AddAuthentication(CookieAuthenticationDefaults.AuthenticationScheme)
    .AddCookie(options =>
    {
        options.LoginPath = "/Account/Login";
        options.LogoutPath = "/Account/Logout";
        options.ExpireTimeSpan = TimeSpan.FromMinutes(30);
        options.SlidingExpiration = true;
        options.Cookie.HttpOnly = true;
        options.Cookie.SecurePolicy = CookieSecurePolicy.Always;
    });
```

- When a user logs in, a **secure authentication cookie** is created to maintain session identity.
- The cookie is **HTTP-only** and **secure**, preventing access via JavaScript and ensuring it is transmitted only over HTTPS.

Authorization

- Role-based access control ensures that only authorized users can access certain functionalities.
- Example roles:
 - **Admin** – full access to manage users, suppliers, and reports.
 - **Supervisor** – can approve and track orders.
 - **Supplier** – can view and respond to order requests.

Code for Authorization

```
[Authorize(Roles = "Admin")]
public IActionResult Dashboard()
{
    return View();
}
```


This ensures **data integrity** by preventing unauthorized changes or access to sensitive mining records.

Data Validation and Integrity Controls

At the database and model level:

- **Entity Framework Core** enforces constraints such as [Required], [StringLength], and [ForeignKey].
- Data annotations and server-side validation ensure that invalid or incomplete data cannot be saved.

Example:

Code for Data Validation and integrity control

```
public class MaterialRequest
{
    public int Id { get; set; }

    [Required]
    public string ItemName { get; set; }

    [Required]
    [Range(1, int.MaxValue)]
    public int Quantity { get; set; }

    [Required]
    public int SupplierId { get; set; }
}
```

Minimum Requirements for the Software Solution

1. Authentic Software Solution for a Disadvantaged Community

The **Mining Order Management System (MOMS)** is designed for **Khula Mining Corporation**, which operates in rural and remote mining locations. Previously, order handling was done manually using paper and phone calls, leading to lost records, duplicate orders, and delays.

This system automates and centralizes the ordering process for **supervisors, suppliers, and admin staff**, improving transparency and efficiency.

Purpose and Community Benefit:

- Reduces administrative delays in remote mining operations.
- Digitally empowers under-resourced departments (Procurement, Suppliers, Supervisors).
- Increases data reliability and accountability for mining logistics.

2. Administrative (Backend) and User (Frontend) Functionalities

Administrative Functions

- **Admin Dashboard:** Provides an overview of all material requests, approvals, and supplier records.
- **User Management:** Admin can register new supervisors and suppliers.
- **Report Generation:** Exports data to Excel/PDF and generates analytics via DashboardAnalyticsService.

User Functions

- **Supervisor Portal:** Create and track material requests and monitor approval statuses.
- **Supplier Portal:** View assigned orders, upload invoices, and update delivery information.
- **Login and Profile Management:** Users authenticate via secure login before accessing their respective dashboards.

Technologies Used:

- **Backend:** ASP.NET Core MVC, C#, Entity Framework Core.
- **Frontend:** Razor Views + Bootstrap 5 for responsive design.
- **Services:** Custom ReportService and DashboardAnalyticsService.

3. Cloud-Based Database

The project uses **Microsoft Azure SQL Database** to meet the cloud-based data requirement.

All data (Users, Orders, Invoices, Suppliers) is stored securely in the cloud.

Implementation Details:

- Hosted on **Azure SQL Server** with SSL encryption.
- Entity Framework Core used for schema migrations.
- Database designed with **referential integrity and relationships** (see ERD).
- Enables real-time multi-site data synchronization.

4. Desktop / Mobile Application

The **MOMS system** runs as a **responsive web application** that adapts to desktop and mobile browsers.

Bootstrap and media queries ensure proper display on all screen sizes.

Key Features:

- Mobile-friendly navigation for supervisors working on site.
- Desktop dashboard for admin users at headquarters.

- Cross-platform functionality using ASP.NET MVC + Bootstrap.

5. Security and Data Integrity

Authentication

Implemented using **ASP.NET Core Authentication** with **secure cookies**:

Code for Cookie-based Authentication

```
builder.Services.AddAuthentication(CookieAuthenticationDefaults.AuthenticationScheme)
    .AddCookie(options =>
    {
        options.LoginPath = "/Account/Login";
        options.LogoutPath = "/Account/Logout";
        options.ExpireTimeSpan = TimeSpan.FromMinutes(30);
        options.SlidingExpiration = true;
        options.Cookie.HttpOnly = true;
        options.Cookie.SecurePolicy = CookieSecurePolicy.Always;
    });
```

Authorization

Role-based access control (RBAC) ensures users only access allowed sections.

Code for Cookie-based Authentication

```
[Authorize(Roles = "Admin")]
public IActionResult AdminDashboard() => View();
```

Password Security

- Passwords are hashed using ASP.NET Identity's PasswordHasher.
- No plain text passwords stored in the database.

SQL Injection Prevention

All queries are executed via **Entity Framework Core** (parameterized).

Example:

Code for Entity Framework Core

```
var requests = await _context.MaterialRequests
    .Where(r => r.Status == "Pending")
    .ToListAsync();
```

Two-Factor Authentication (2FA)

Enabled through ASP.NET Identity token providers (optional setup for production).

HTTPS Enforcement

All traffic is served over HTTPS:

```
app.UseHttpsRedirection();
```

6. Error Handling and Input Validation

The system uses both **server-side** and **client-side validation** to prevent invalid data entry.

The screenshot displays the 'Create User' form in the MiningOps.d application. The interface includes a dark sidebar with navigation links: Admin Dashboard, Dashboard, User Management (highlighted), Inventory, Suppliers, Requests, Orders & Procurement, Payment Processing, and a ROLES section with Supervisor Dashboard and Supplier Portal. The main content area has a header 'Welcome, Mining Operator!' and a search bar. The 'Create User' form is titled 'Add a new user to the system' and contains the following fields and validation messages:

- Full Name:** 'Enter full name' (required, red border).
- Username:** 'Enter username' (required, red border).
- Email Address:** 'Enter email address' (required, red border).
- Phone Number:** 'Enter phone number' (required, red border).
- Password:** '*****' (must be a string or array type with a minimum length of 8, green checkmark).
- Confirm Password:** '*****' (passwords do not match, green checkmark).
- User Role:** '-- Select Role --' (required, dropdown menu).

At the bottom of the form, there are two buttons: 'Creating User...' and 'Back to List'. A 'Role descriptions' section on the right lists: Admins: Full system access and user management, Supervisors: Team management and reporting, and Suppliers: Inventory and order management.

Conclusion

The Mining Order Management System (MOMS) successfully provides a modern, efficient, and secure digital solution for managing material requests and supplier operations within the mining industry. By automating manual processes, the system ensures accurate tracking of orders, transparency in communication, and faster decision-making for administrators and supervisors.

Through the integration of a cloud-based database, MOMS enhances data accessibility, scalability, and reliability, ensuring that all records are securely stored and easily retrievable. The inclusion of role-based authentication, error handling, and validation mechanisms guarantees a secure and user-friendly environment for all system users.

Overall, MOMS demonstrates how technology can optimize industrial workflows, reduce operational inefficiencies, and contribute to better resource management. The system stands as a strong foundation for future enhancements such as predictive analytics, mobile app integration, and AI-driven reporting to further support sustainable mining operations.

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