

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 being placed manually through paperwork or phone calls. Records are kept in physical logbooks, and there is often a lack of synchronization between departments. This has resulted in 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

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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
started

8 Work items
completed

Members 3

RK SN PP

Team Member

MT Mining Order Operation Management Team
The default project team.
Relevant links: [Notifications](#) | [Dashboards](#) | [Iterations and Area Paths](#)

Members Settings

Total 3

Direct Members Add

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

Epic

Order	Work Item Type	Title	State	Effort	Busin...	Value Area	Start Date	Target Date
1	Epic	> 🚧 System Quality & Delivery	● Resolved	9	Business	Business	10/9/2025 12:00 AM	10/15/2025 12:00 AM
2	Epic	> 🚧 Payments & Reporting	● Resolved	9	8	Business	10/16/2025 12:00 AM	10/21/2025 12:00 AM
3	Epic	> 🚧 Supplier Management & Orders	● Resolved		7	Business	10/2/2025 12:00 AM	10/8/2025 12:00 AM
4	Epic	> 🚧 Authentication & Setup	● Resolved	8	6	Business	9/25/2025 12:00 AM	10/2/2025 12:00 AM
5	Epic	> 🚧 Inventory & Material Requests	● Resolved	8	8	Business	10/2/2025 12:00 AM	10/8/2025 12:00 AM

Stories

Backlog		Analytics						
[+]	-	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 Mana...	
		2	User Story	> 🛠 As a client, I want the system deployed so I can use it.	● Active	Business	Mining Order Operation Mana...	
		3	User Story	> 🛠 As a supervisor, I want to create material requests so I can o...	● Resolved	Business	Mining Order Operation Mana...	
		4	User Story	> 🛠 As a supplier, I want to view purchase orders so I can prepar...	● Resolved	Business	Mining Order Operation Mana...	
		5	User Story	> 🛠 As an admin, I want to generate system reports so I can mo...	● Resolved	Business	Mining Order Operation Mana...	
		6	User Story	> 🛠 As a supplier, I want to update delivery status so supervisor...	● New	Business	Mining Order Operation Mana...	
		7	User Story	> 🛠 As a team, we want to test the system so it works correctly.	● New	Business	Mining Order Operation Mana...	

Task

Work items								
Recently updated		+ New Work Item	Open filtered view in Queries	Column Options	Import Work Items	Recycle Bin	Filter by keyword	Task
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 10:32:16 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 manageme	👤 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 delivery	👤 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 9:21:18 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

Board Analytics

New Active Resolved Closed

New	Active	Resolved	Closed
+ New Item 50 Deployment New 0/1	35 Payment Processing Active Sylvester Zwavuhud Ntswinganani 1/1	0/5	29 Delivery Updates Closed 0/1
45 Testing & QA New 0/1	40 Reports & Analytics Active Sylvester Zwavuhud Ntswinganani 0/1		24 Supplier Dashboard Closed 0/1
			4 User Authentication & Roles Closed 1/1
			3 System Setup & Environment Closed 0/1
			13 Supervisor Requests Closed 0/1
			14 Inventory Management (Admin) Closed 1/1

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

Mining Order Operation Management Team

Taskboard Backlog Capacity Analytics

Project Foundation Person: All

June 28 - August 1 25 work days

New Active Resolved Closed

New	Active	Resolved	Closed
+ New Work Item 5 Configure GitHub Repo + CI/CD Pipeline for mining order management Active Phuti Thabiso Phaka			7 Setup DevOps pipeline for application Closed Phuti Thabiso P...
			8 Configure environments settings(dev/test/prod). Closed Phuti Thabiso P...
6 As a user, I want to log in securely so I can access the system. Closed Phuti Thabiso Phaka			9 Configure role-based access (Admin, Supervisor, Supplier). Closed Phuti Thabiso P...
			10 Implement JWT authentication. Closed Unassigned
			11 Create login UI for web + mobile. Closed Sylvester Zwav...

Supervisor Material Requests Person: All August 4 - August 8
5 work days

New	Active	Resolved	Closed
<p>15 As a supervisor, I want to create material requests so I can order items</p> <ul style="list-style-type: none">ResolvedPhuti Thabiso Phaka	<p>19 Link requests to inventory stock</p> <ul style="list-style-type: none">NewSylvester Zwav...	<p>18 Design Supervisor Dashboard UI</p> <ul style="list-style-type: none">ActivePhuti Thabiso P...	<p>17 Design Supervisor Dashboard UI</p> <ul style="list-style-type: none">ClosedPhuti Thabiso P...

Inventory (Admin) Person: All August 11 - August 15
5 work days

New	Active	Resolved	Closed
<p>20 As an admin, I want to track inventory flow so I can manage stock levels.</p> <ul style="list-style-type: none">3 not startedNewSylvester Zwavhudi N...	<p>32 Integrate with notifications</p> <ul style="list-style-type: none">ActiveSylvester Zwav...		<p>31 Create delivery status update page</p> <ul style="list-style-type: none">ClosedPhuti Thabiso P...

Inventory (Admin) Person: All August 11 - August 15
5 work days

New	Active	Resolved	Closed
<p>20 As an admin, I want to track inventory flow so I can manage stock levels.</p> <ul style="list-style-type: none">3 not startedNewSylvester Zwavhudi N...	<p>32 Integrate with notifications</p> <ul style="list-style-type: none">ActiveSylvester Zwav...		<p>31 Create delivery status update page</p> <ul style="list-style-type: none">ClosedPhuti Thabiso P...

Taskboard Backlog Capacity Analytics September 15 - September 19
5 work days

New	Active	Resolved	Closed
<p>41 As an admin, I want to generate system reports so I can monitor operations.</p> <ul style="list-style-type: none">ResolvedPhuti Thabiso Phaka		<p>42 Sales/Order Report</p> <ul style="list-style-type: none">ActiveSylvester Zwav...	<p>43 Inventory Report</p> <ul style="list-style-type: none">ClosedSylvester Zwav...

Taskboard Backlog Capacity Analytics September 29 - October 3
5 work days

New	Active	Resolved	Closed
<p>36 As an admin, I want to process supplier payments so transactions are recorded</p> <ul style="list-style-type: none">ClosedPhuti Thabiso Phaka	<p>38 Add invoice validation</p> <ul style="list-style-type: none">ActiveSylvester Zwav...		<p>37 Implement payment module</p> <ul style="list-style-type: none">ClosedSylvester Zwav...

The image contains two screenshots of the Microsoft Azure DevOps Boards interface.

Screenshot 1: QA-Testing Backlog

- Filter:** QA-Testing, Person: All
- Columns:** New, Active, Resolved, Closed
- Active Work Items:**
 - 46 As a team, we want to test the system so it works correctly. (New, Phuti Thabiso Phaka)
 - 47 Unit testing (Active, Sylvester Zwav...)
 - 48 Integration testing (Active, Phuti Thabiso P...)
 - 49 User acceptance testing (Active, Sylvester Zwav...)
- Resolved:** None
- Closed:** None
- Timeline:** October 6 - October 10, 5 work days

Screenshot 2: Deployment and Final Delivery Backlog

- Filter:** Deployment and Final Delivery, Person: All
- Columns:** New, Active, Resolved, Closed
- Active Work Items:**
 - 51 As a client, I want the system deployed so I can use it. (Active, Phuti Thabiso Phaka)
 - 52 Deploy to Azure environment (New, Phuti Thabiso P...)
 - 53 Final client demo (New, Sylvester Zwav...)
 - 54 Handover documentation (New, Phuti Thabiso P...)
- Resolved:** None
- Closed:** None
- Timeline:** October 13 - October 17, 5 work days

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

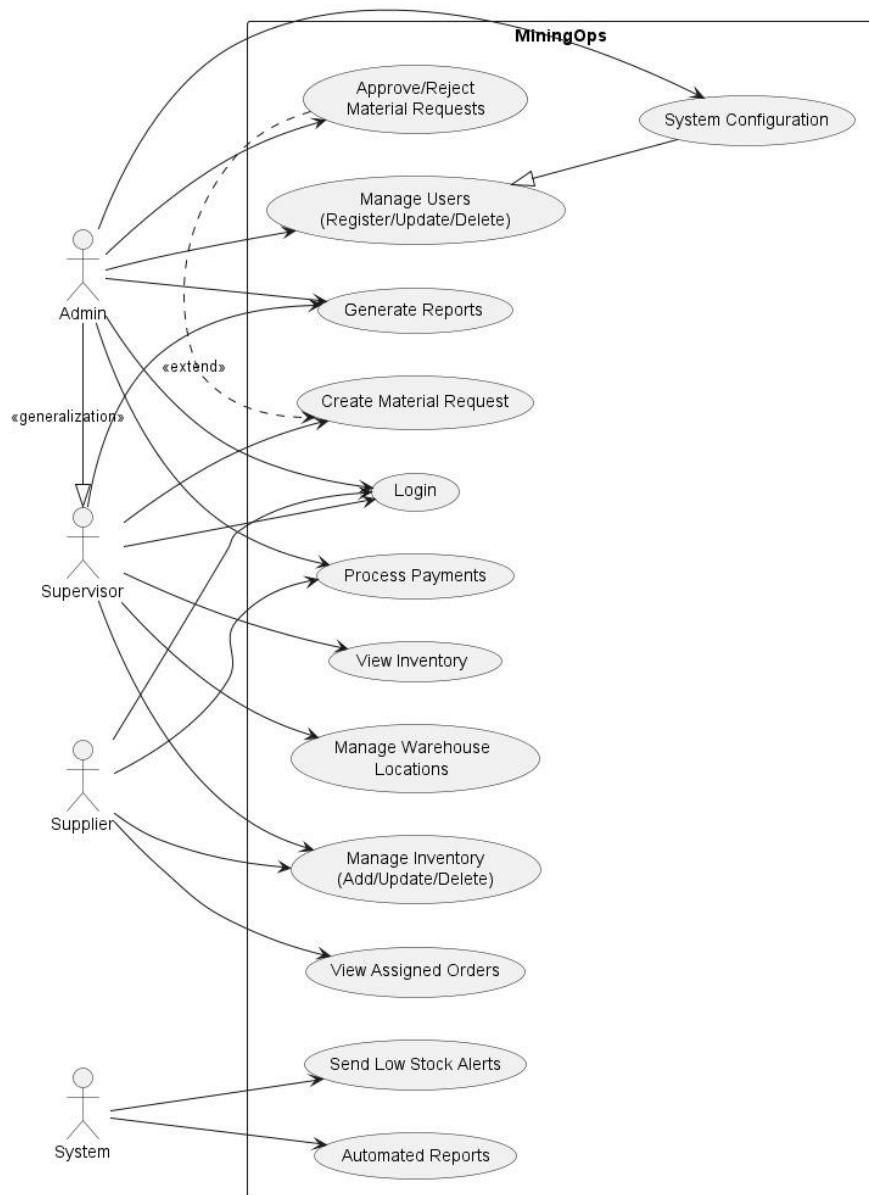
- **Backend:** ASP.NET Core MVC, Entity Framework Core
- **Frontend:** Razor Pages, Bootstrap 5, JavaScript
- **Database:** Azure SQL
- **Version Control:** GitHub with Pull Requests

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

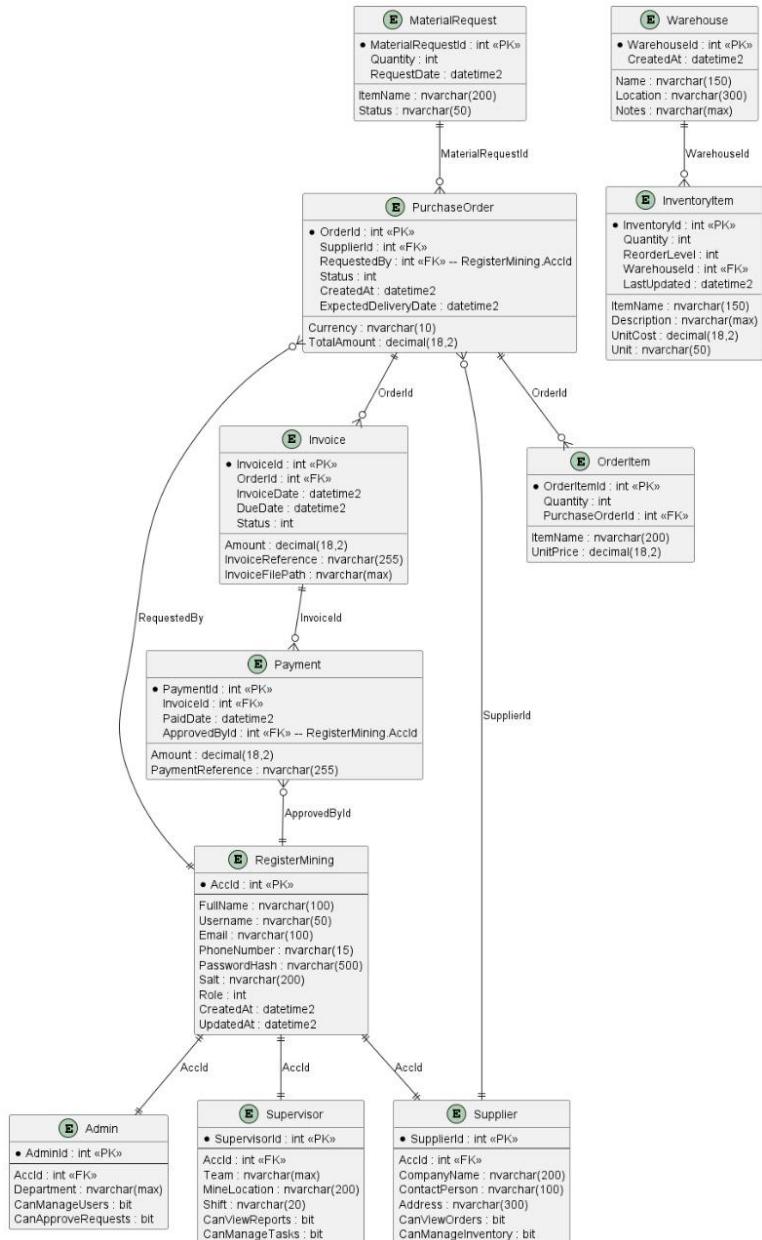
Phase 3

Designing and Developing of MOMs

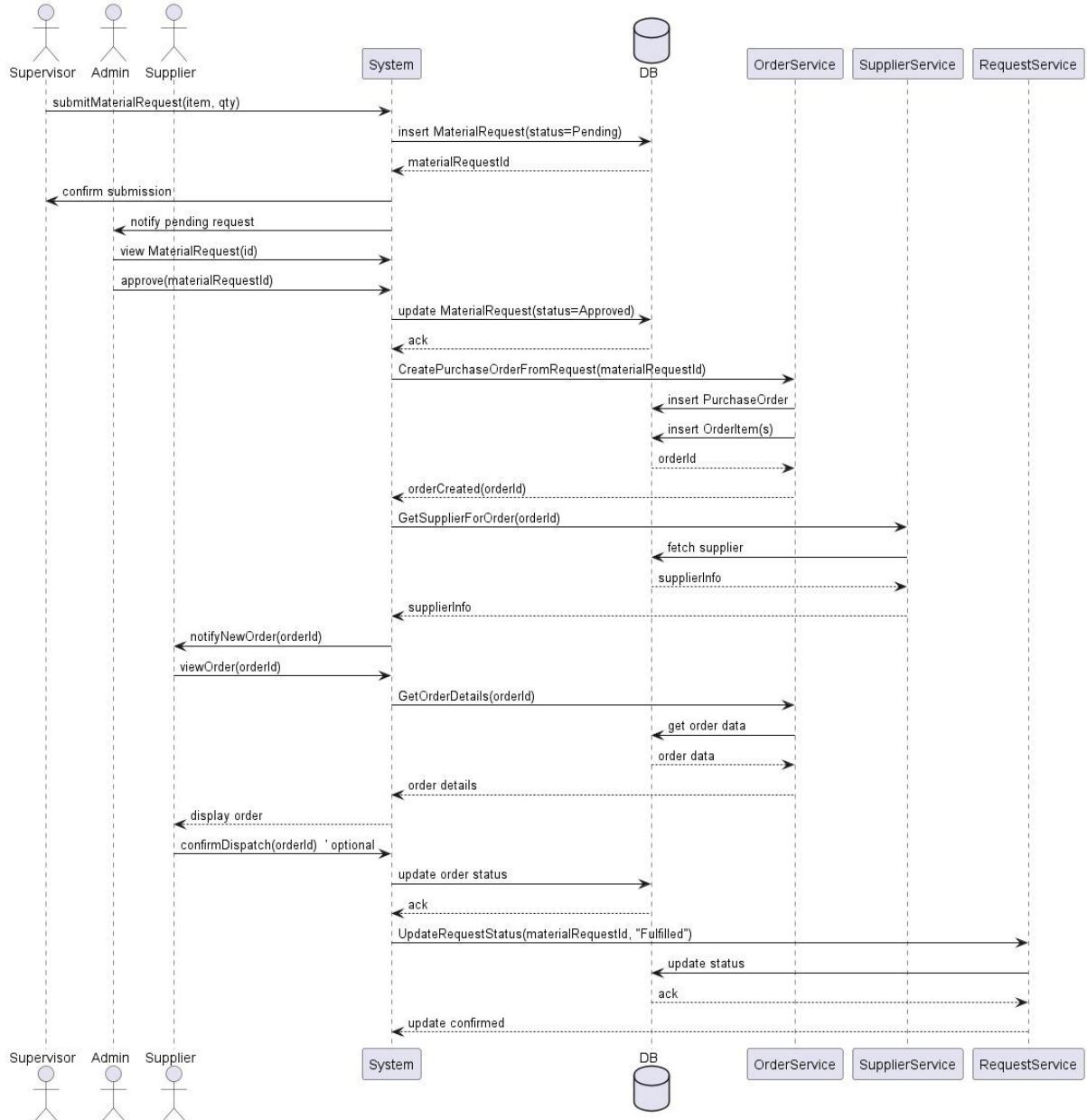
UML diagrams



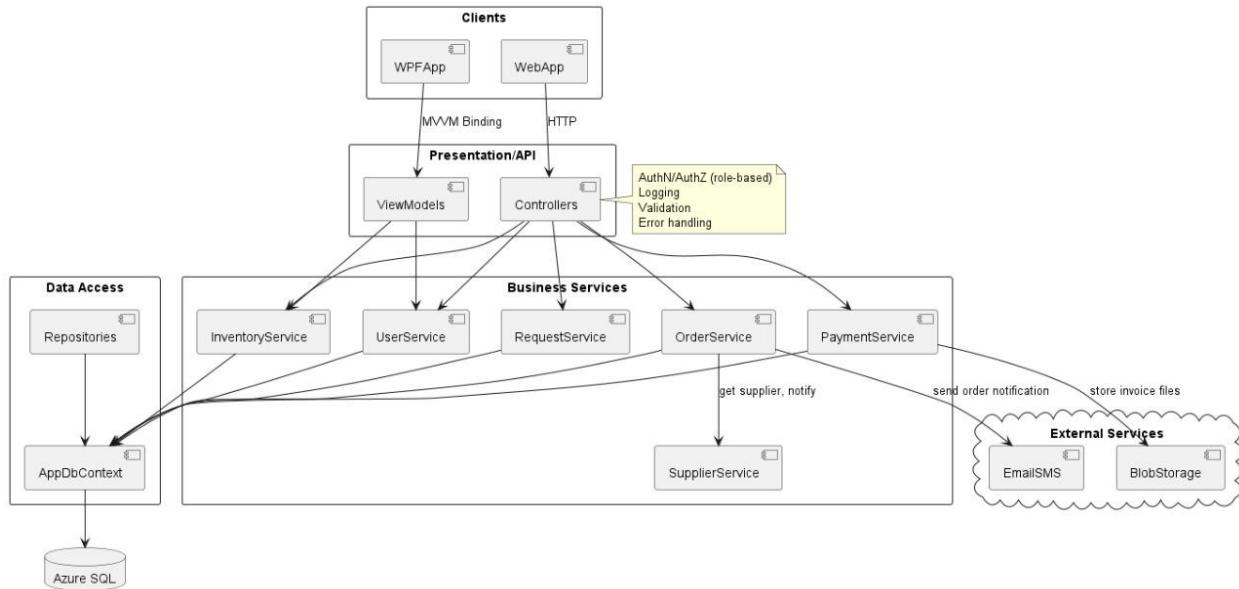
ER Diagram



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/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

Remember Me

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 BI



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	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
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- Requests
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- Roles
- [Logout](#)

Welcome, System Administrator

Admin

Dashboard Overview

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

Stock: 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: \$51,000.00 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

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	Edit Details Delete
2	testedit	tesdesedit	9	\$55.00	22	General Materials Sto	10/16/2025	Low Stock	Edit Details Delete
3	Hydraulic Drill Bit	Heavy-duty drill bit used for undergr	500	\$150.00	0	Open Pit Workshop	10/21/2025	Available	Edit Details Delete

MiningOps

Welcome, System Administrator

Admin

Payment Processing Dashboard

Total Payments
19

Outstanding
\$80,540.00

Paid This Month
\$331,209.00

Overdue Invoices
0

Unpaid Invoices
9

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	Oct 25	\$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

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			Details Approve
2		\$35,000.00	10/25/2025	PAY-INV-8-20251025-2117			Details Approve
3		\$21.00	10/25/2025	PAY-INV-12-20251025-212			Details Approve
4		\$45,000.00	10/25/2025	PAY-INV-9-20251025-2122			Details Approve
5		\$270.00	10/25/2025	PAY-INV-10-20251025-213			Details Approve
6		\$35,000.00	10/26/2025	PAY-INV-8-20251025-1937			Details Approve
7		\$45,000.00	10/26/2025	PAY-INV-9-20251025-2020			Details Approve

MiningOps

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	\$165.00	Confirmed
Oct 28		
HardwareOps	\$50,031.00	Pending
Oct 27		
HardwareOps	\$100,000.00	On Hold
Oct 27		
HardwareOps	\$30.00	

MiningOps

Welcome, System Administrator

Admin

User Management

TOTAL USERS	ADMINISTRATORS	SUPERVISORS	SUPPLIERS
3 All Registered Users	1 System Administrators	1 Operation Supervisors	1 Vendor Suppliers

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	
2	supplier1	supplier1@miningops.com	Supplier One	Supplier	555-0002	10/30/2025	
3	supervisor1	supervisor1@miningops.com	Supervisor One	Supervisor	555-0003	10/30/2025	

+ Add New User

Refresh Data

MiningOps

Welcome, System Administrator

Notifications

Total: 3 Unread: 2 Read: 1 Refresh Apply Filters

New Material Request
Supervisor John submitted a new material request for mining equipment
Oct 30, 2025 08:16 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 04:18 PM ✓ Read Delete

Mark All as Read Clear All

MiningOps

Welcome, System Administrator

Supplier Management + Add Supplier Admin

Supplier Overview

Total Suppliers 3 registered vendors	Active Suppliers 3 currently active	Total Orders 12 all-time orders	Pending Orders 8 awaiting fulfilment
---	--	------------------------------------	---

Quick Actions

Supplier Report Refresh Data Contact List

Search

Recent Suppliers

Supplier	Contact Person	Phone
New Supplier	Lethabo	0730719062
hack Truck	onela@gmail.com	0790820314
HardwareOps	Henry	0730719062

Supplier Performance

Top Supplier	Avg Response	Completion Rate
HardwareOps	2.3 days	94%

Supplier List

ID	Company Name	Contact Person	Email	Phone	Address	Actions
1	New Supplier	Lethabo	lethabo@gmail.com	0730719062	Default Address	
2	hack Truck	onela@gmail.com		0790820314	9 Sports Road, Slaterville, Benoni 151	
5	HardwareOps	Henry	phuthabiso4@gmail.com	0730719062	22 Queens Street, Kensington Jhb	

MiningOps

- Dashboard
- User Management
- Inventory
- Suppliers
- Requests
- Orders & Procurement
- Payment Processing
- Notifications

Roles

[Logout](#)

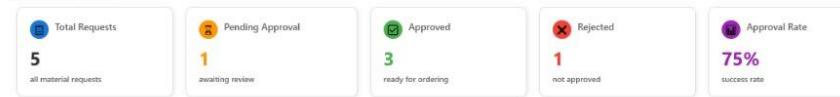
Welcome, System Administrator

Admin

Material Request Management

+ New Request

Request Overview



Quick Actions

[Request Report](#) [Refresh Data](#) [Bulk Approve](#) [Pending Report](#)

Urgent Requests 1

test2 55 needed

Search

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	Edit Approve Reject Delete
2	Copper Wire 10mm	3	Approved	10/17/2025	14 days ago	Edit Approve Reject Delete
3	Grinder plate	21	Approved	10/16/2025	14 days ago	Edit Approve Reject Delete
4	test	7	Rejected	10/25/2025	5 days ago	Edit Approve Reject Delete
5	test2	55	Pending	10/29/2025	2 days ago	Edit Approve Reject Delete

Interphase for Mobile App using Tablet

The image displays two screenshots of a tablet screen showing a mobile application interface for a mining operator. The top screenshot shows the 'Supplier Dashboard' with statistics: Total Orders (0), Total Invoices (0), Paid Invoices (0), and Pending Payments (0,00). The bottom screenshot shows the 'User Details' page for a user named Phuti Thabiso Phaka, with fields for basic information, account timeline, and admin profile.

Supplier Dashboard

- Total Orders: 0
- Total Invoices: 0
- Paid Invoices: 0
- Pending Payments: 0,00

User Details

Phuti Thabiso Phaka (Admin)

User Information

Basic Information	Account Timeline
FULL NAME: Phuti Thabiso Phaka	USERNAME: Mining Operator
EMAIL ADDRESS: phutithabiso4@gmail.com	PHONE NUMBER: 0730719062
CREATED AT: September 28, 2025 at 07:04 pm	LAST UPDATED: Never updated

Admin Profile

DEPARTMENT	PERMISSIONS
Operator	Manage Users Approve Requests

Buttons: Edit User, Back to List, Print

Welcome, Mining Operator!

Payments

Manage and track all payment transactions

Payments List		Invoices	Create New		
0	\$331 209,00	0	1		
TOTAL PAYMENTS	TOTAL AMOUNT	TODAY'S PAYMENTS	CURRENT PAGE		
100000	\$331 209,00	0	1		
INVOICE	PAYMENT DATE	AMOUNT	APPROVED BY	REFERENCE	ACTIONS
INV-100000	Oct 25, 2025	\$30000,00	phutthabiso@gmail.com	PAY-INV-9-20251025-211715	Edit View Delete
INV-100001	Oct 25, 2025	\$35000,00	phutthabiso4@gmail.com	PAY-INV-9-20251025-211735	Edit View Delete
INV-100002	Oct 25, 2025	\$21,00	phutthabiso@gmail.com	PAY-INV-10-20251025-212247	Edit View Delete
INV-100003	Oct 25, 2025	\$45000,00	phutthabiso4@gmail.com	PAY-INV-9-20251025-212256	Edit View Delete
INV-100004	Oct 25, 2025	\$270,00	phutthabiso4@gmail.com	PAY-INV-10-20251025-213401	Edit View Delete
INV-100005	Oct 26, 2025	\$35000,00	phutthabiso@gmail.com	PAY-INV-9-20251025-193716	Edit View Delete
INV-100006	Oct 26, 2025	\$45000,00	phutthabiso4@gmail.com	PAY-INV-9-20251025-202045	Edit View Delete
INV-100007	Oct 26, 2025	\$270,00	phutthabiso4@gmail.com	PAY-INV-10-20251025-202113	Edit View Delete
INV-100008	Oct 26, 2025	\$270,00	phutthabiso4@gmail.com	PAY-INV-10-20251025-202114	Edit View Delete
INV-100009	Oct 26, 2025	\$45000,00		PAY-INV-9-20251025-202133	Edit View Delete
INV-100010	Oct 26, 2025	\$45000,00		PAY-INV-9-20251025-211421	Edit View Delete
INV-100011	Oct 26, 2025	\$21,00	phutthabiso4@gmail.com	PAY-INV-12-20251025-211634	Edit View Delete
INV-100012	Oct 26, 2025	\$21,00	phutthabiso4@gmail.com	PAY-INV-12-20251025-212930	Edit View Delete
INV-100013	Oct 26, 2025	\$21,00	phutthabiso4@gmail.com	PAY-INV-12-20251025-212947	Edit View Delete
INV-100014	Oct 26, 2025	\$21,00	phutthabiso4@gmail.com	PAY-INV-12-20251025-213125	Edit View Delete
INV-100015	Oct 26, 2025	\$21,00	phutthabiso4@gmail.com	PAY-INV-12-20251025-213944	Edit View Delete
INV-100016	Oct 26, 2025	\$3,00	phutthabiso4@gmail.com	PAY-INV-15-20251026-214121	Edit View Delete
INV-100017	Oct 27, 2025	\$270,00		PAY-13-20251027140133	Edit View Delete
INV-100018	Oct 27, 2025	\$45000,00	lethabo@gmail.com	PAY-6-20251027140231	Edit View Delete

Show: 10 entries per page

Showing 1 to 0 of 0 entries

Welcome, Mining Operator!

Complete Supplier Profile

Supplier Profile Information

Company Name:

Contact Person:

Address:

Role: Can View Orders Can Manage Inventory

[Save Profile](#) [Cancel](#)

Welcome, Mining Operator!

Search...

Create Supplier Contract

Establish a new contractual agreement with a supplier

Contract Details

Supplier: **Start Date**:

Payment Terms: **End Date**:

Contract Duration: **0 days**
Total contract period
[Get 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): **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

Item Information

Item Name *: **Quantity ***:

Description:

Unit Cost *:

Reorder Level: Alert when stock reaches this level

Warehouse:

Unit:

Last Updated: 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**

Welcome, Mining Operator!

Order Items

Manage all order items and their details

ITEM NAME	QUANTITY	UNIT PRICE	TOTAL PRICE	PURCHASE ORDER	ACTIONS
Drill Bits	5000	\$7.00	\$35 000.00	View	
Drill Bits	5000	\$8.00	\$40 000.00	View	
Copper Wire 10mm	5	\$90.00	\$450.00	View	
Grinder plate	21	\$1.00	\$21.00	View	
Copper Wire 10mm	3	\$10.00	\$30.00	View	
Diesel	22	\$500.00	\$11 000.00	View	
Copper Wire 10mm	3	\$1.00	\$3.00	View	
Copper Wire 10mm	3	\$10.00	\$30.00	View	
Drill Bits	5000	\$20.00	\$100 000.00	View	
Drill Bits	5000	\$10.00	\$50 000.00	View	
Grinder plate	21	\$1.00	\$21.00	View	
Copper Wire 10mm	5	\$55.00	\$275.00	View	

Welcome, Mining Operator!

Supplier Dashboard

Complete overview of supplier performance and contracts

Quick Actions: [All Suppliers](#) [All Contracts](#) [All Performance](#) [Export Report](#)

Total Suppliers	Active Contracts	Expiring Soon	Avg Quality	Avg Delivery	Active Suppliers
3	0	0	3.0	5 900.0%	0

Supplier Summary

SUPPLIER	STATUS	CONTRACTS	EXPIRING	QUALITY RATING	DELIVERY RATE	PERFORMANCE	ACTIONS
New Supplier	Inactive	0 active	0	0.0	0.0%	Needs Improvement	
Lehabo	Inactive	0 active	0	5.0	0.7000%	Excellent	
New Supplier	Inactive	0 active	0	4.0	0.9000%	Excellent	
HardwareOps	Inactive	0 active	0	5.0	0.7000%	Excellent	
HardrockOpc	Inactive	0 active	0	4.0	0.9000%	Excellent	

Showing 3 suppliers • 0 active contracts • 0 expiring soon

Last updated: Oct 30, 2025 2045

[Quick Contracts](#) [Create New Contract](#) [View All Contracts](#)

[Performance Tracking](#) [Add Performance Record](#) [View All Performance](#)



Welcome, Mining Operator!

Invoices

Manage and track all issued invoices.

Order	Invoice Date	Due Date	Amount	Status	Reference	File Path	Actions
ORD001	Oct 25, 2025	Nov 24, 2025	R55,000,00	Oversize	INV-8-20251025	No file	[Edit, View, Delete]
ORD002	Oct 25, 2025	Nov 24, 2025	R45,000,00	Oversize	INV-9-20251025	No file	[Edit, View, Delete]
ORD010	Oct 25, 2025	Nov 24, 2025	R270,00	Oversize	INV-10-20251025	No file	[Edit, View, Delete]
ORD011	Oct 25, 2025	Nov 24, 2025	R21,00	Oversize	INV-11-20251025	No file	[Edit, View, Delete]
ORD013	Oct 25, 2025	Nov 24, 2025	R30,00	Oversize	INV-13-20251025	No file	[Edit, View, Delete]
ORD012	Oct 25, 2025	Nov 24, 2025	R21,00	Oversize	INV-12-20251025	No file	[Edit, View, Delete]
ORD015	Oct 26, 2025	Nov 25, 2025	R3,00	Oversize	INV-15-20251026	No file	[Edit, View, Delete]
ORD019	Oct 27, 2025	Oct 31, 2025	R51,000,00	Paid	INV-9-20251027133705	No file	[Edit, View, Delete]
ORD010	Oct 27, 2025	Nov 08, 2025	R270,00	Unpaid	INV-10-20251027133806	No file	[Edit, View, Delete]
ORD016	Oct 28, 2025	Nov 27, 2025	R30,00	Oversize	INV-16-20251028	No file	[Edit, View, Delete]
ORD019	Oct 28, 2025	Nov 27, 2025	R165,00	Oversize	INV-19-20251028	No file	[Edit, View, Delete]

Welcome, Mining Operator!

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	-	<button>Edit</button> <button>Details</button> <button>Delete</button>
Phuti Thabiso Phaka	Mining Operator	phutithabiso4@gmail.com	0730719062	Admin	Profile Incomplete	2025-09-28 19:04	-	<button>Edit</button> <button>Details</button> <button>Delete</button>
Lethabo	Iethabo@	Iethabo@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	-	<button>Edit</button> <button>Details</button> <button>Delete</button>
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	-	<button>Edit</button> <button>Details</button> <button>Delete</button>
Kali Smith	Kali	miningops@gmail.com	0730719062	Supplier	Profile Incomplete	2025-10-17 09:24	-	<button>Edit</button> <button>Details</button> <button>Delete</button>

Inventory Management

Manage and track all inventory items across warehouses

Inventory Management

Manage and track all inventory items across warehouses

Manage Warehouses

Filters & Search

Search Items	Warehouse	Category	Stock Status
<input type="text"/> Search item name or description	All Warehouses	All Categories	All Status
<button>Apply Filters</button> <button>Clear Filters</button>			

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 for...	500 In Stock	R150,00	Open Pit Workshop Depot	Oct 21, 2025 09:06	
testedit	testesedit	5 Low Stock	R55,00	General Materials Storage	Oct 16, 2025 23:41	
testitem	test description	3 In Stock	R22,00	Fuel Depot	Oct 16, 2025 23:32	

Welcome, Mining Operator!

Supplier Contracts

Manage all supplier contracts and agreements.

+ Create New Contract

1 Total Contracts	0 Active	0 Expired 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 9050	Confidentiality	The Supplier shall not disclose a...	Net 30	Oct 17, 2025 ?? .-.	Oct 24, 2025	\$0.00	Expired	0	

Showing 1 contracts • 0 active • 0 expiring soon

Last updated: Oct 30, 2025 20:47

Quick Filters:

- All Contracts (1)
- Active (0)
- Expanding Soon (0)
- Expired (1)
- Ongoing (0)

Welcome, Mining Operator!

Supplier Performance

Track and manage supplier performance metrics.

+ Add Performance Record

Performance Dashboard

Supplier	Report Date	On-Time Delivery	Quality Rating	Compliance Score	Performance Score	Rating	Actions
HardwareOps Henry	Oct 21, 2025	9 000%	4.0 ★★★☆☆	60.0	51.3	Excellent	
hack Truck 072 274 9050	Oct 21, 2025	8 700%	5.0 ★★★★★	90.0	60.7	Excellent	

2 Records

8 850,0% Avg. Delivery Rate

4,5 Avg. Quality Rating

75,0 Avg. Compliance

56,0 Overall Score

Welcome, Mining Operator!

Warehouse Management

Manage all warehouse locations and inventory storage.

Manage Inventory

3 Total Warehouses	3 Active	0 Total Items	100% Capacity
--------------------	----------	---------------	---------------

Search warehouses...

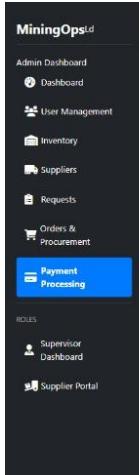
Create New Warehouse

Warehouse List

WAREHOUSE NAME	LOCATION	NOTES	CREATED DATE	ACTIONS
Open Pit Workshop ID: 1	Near Diesel Refueling Station (OP-WRK-01)	Stores parts for heavy mining equipment.	Oct 01, 2025 12:45 pm	
Fuel Depot ID: 2	Mine Site B – South Yard	Diesel and petrol storage tanks.	Oct 10, 2025 07:02 pm	
General Materials Storage ID: 3	For non-critical materials like hoses, ropes, and timber.	For non-critical materials like hoses, ropes, and timber.	Oct 10, 2025 09:05 pm	

Showing 3 warehouses

Previous Next



MiningOps Ltd

- [Admin Dashboard](#)
- [Dashboard](#)
- [User Management](#)
- [Inventory](#)
- [Suppliers](#)
- [Requests](#)
- [Orders & Procurement](#)
- [Payment Processing](#)

ROLES

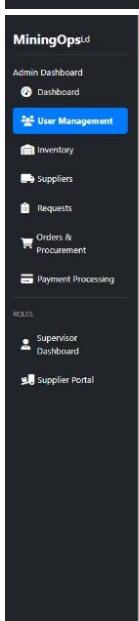
- [Supervisor Dashboard](#)
- [Supplier Portal](#)

Welcome, Mining Operator!

Payments

Manage and track all payment transactions

Payments List					
		\$331 209,00		0 TODAY'S PAYMENTS	
TOTAL PAYMENTS	TOTAL AMOUNT	0	TODAY'S PAYMENTS	1 CURRENT PAGE	
INVOICE	PAYMENT DATE	AMOUNT	APPROVED BY	REFERENCE	ACTIONS
INV#1	Oct 25, 2025	\$35000,00	phutthabis04@gmail.com	PAY-INV-8-20251025-211715	
INV#2	Oct 25, 2025	\$35000,00	phutthabis04@gmail.com	PAY-INV-8-20251025-211735	
INV#3	Oct 25, 2025	\$21,00	phutthabis04@gmail.com	PAY-INV-12-20251025-212247	
INV#4	Oct 25, 2025	\$45000,00	phutthabis04@gmail.com	PAY-INV-9-20251025-212256	
INV#5	Oct 25, 2025	\$970,00	phutthabis04@gmail.com	PAY-INV-10-20251025-213401	



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ROLES

- [Supervisor Dashboard](#)
- [Supplier Portal](#)

Welcome, Mining Operator!

Create User

Add a new user to the system

User Information

Full Name	Password	Confirm Password
Enter full name	Enter password	Confirm password
Username	User Role	
Enter username	-- Select Role --	
Email Address	Role descriptions:	
Enter email address	Admin: Full system access and user management Supervisor: Team management and reporting Supplier: Inventory and order management	
Phone Number		
Enter phone number		

[Create User](#) [Back to List](#)

Welcome, Mining Operator!

Material Requests
Manage and track all material requests

Item Name	Quantity	Status	Request Date	Actions
test2	55	Pending	Oct 29, 2025	Edit
test	7	Rejected	Oct 25, 2025	Edit
Copper Wire 10mm	3	Approved	Oct 17, 2025	Edit
Grinder plate	21	Approved	Oct 16, 2025	Edit
Drill Bits	5000	Approved	Oct 15, 2025	Edit

Welcome, Mining Operator!

Supplier Dashboard

Total Suppliers	Total Orders	Total Payments (ZAR)	Overdue Invoices
3	12	331 209,00	9

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.

The screenshot shows the Microsoft Azure portal interface. At the top, there's a code editor window titled "Schema: https://www.schemastore.org/appsettings.json" containing JSON configuration code. Below it is the "ApplicationData (st10219717/ApplicationData) | Query editor (preview)" window. The left sidebar shows navigation links like Overview, Activity log, Tags, and a prominent "Query editor (preview)". The main area displays a list of tables under "Tables", including "dbo._EMigrationsHistory", "dbo.AdminProfiles", "dbo.CategoryRetailDb", "dbo.CategoryTableEntity", "dbo.CustomerTableEntity", "dbo.DisasterReliefs", "dbo.Donations", "dbo.Events", "dbo.InventoryDb", "dbo.InventoryTableEntity", "dbo.InvoicesDb", "dbo.MaterialRequestsDb", "dbo.OrderItemRetailDb", "dbo.OrderItemsDb", and "dbo.OrderRetailDb". A message in the center says "Showing limited object explorer here. For full capability please click here to open Azure Data Studio." The bottom right has tabs for "Results" and "Messages" and a search bar.

```

Schema: https://www.schemastore.org/appsettings.json
1   "ConnectionStrings": {
2     "Defaults": "Server=tcp:st10219717.database.windows.net,1433;Initial Catalog=ApplicationData;Persist Security Info=False;User ID=st10219717;Password=SPhaka94;MultipleActiveResultSets=False;Encrypt=True;TrustServerCertificate=False;Connection Timeout=30;"
3   },
4   "Logging": {
5     "LogLevel": {
6       "Default": "Information",
7       "Microsoft.AspNetCore": "Warning"
8     }
9   },
10  "AllowedHosts": "*"
11},
12
13

```

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 intergrity 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.

Welcome, Mining Operator!

Create User

Add a new user to the system

User Information

Full Name: Enter full name
Full Name is required

Password:
The field Password must be a string or array type with a minimum length of '8'.

Confirm Password:
Passwords do not match

Username: Enter username
Username is required

Email Address: Enter email address
Email is required

Phone Number: Enter phone number
Phone Number is required

User Role: -- Select Role --
The Role Field is required

Role descriptions:
• Admin: Full system access and user management
• Supervisor: Team management and reporting
• Supplier: Inventory and order management

Creating User... Back to List

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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