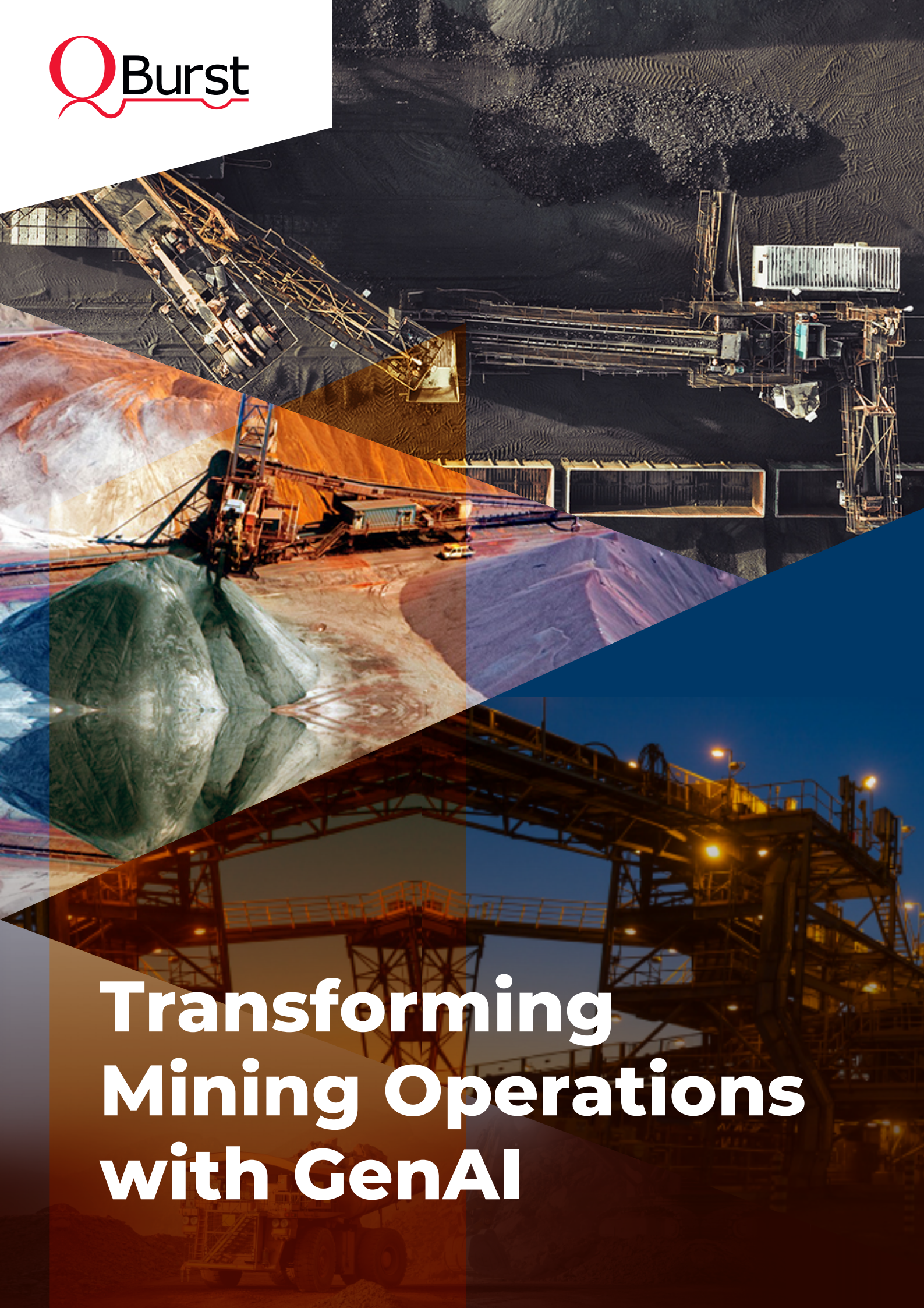
QBurst



Transforming Mining Operations with GenAI

Overview

A GenAI solution for mining that transforms how users interact with operational data. The AI-driven system enables seamless access to Key Performance Indicators (KPIs) through natural language queries, enabling users to retrieve specific metrics, track historical trends, and generate summarized reports using text or voice commands. The mobile application offers an intuitive interface that integrates with the company's existing data systems, ensuring real-time updates and accurate insights.

Client Profile

A leading mining company based in the Middle East, operating multiple mining sites. The company's tech-driven approach leverages advanced tools to enhance its operations in natural resource extraction and processing.

Business Requirement

The client needed a solution that would provide senior management and government officials easy access to mining operations KPIs.

- Enable efficient retrieval of historical and current performance data
- Eliminate the complexity of traditional database navigation
- Support voice and text queries
- Deliver insights in an easily understandable format

Our Solution

The solution architecture integrates GenAI capabilities with robust backend systems to deliver a comprehensive platform for mining operations intelligence. The backend infrastructure is built using Python, handling complex data processing and API orchestration, while a MySQL database serves as the primary data store, optimized for efficient KPI data retrieval and historical analytics. REST APIs enable seamless integration with existing mining systems, ensuring real-time data synchronization, while OpenAI's language models power natural language processing and response generation.

The GenAI implementation leverages Retrieval Augmented Generation (RAG) to enhance the accuracy and context-awareness of chatbot responses. Through careful prompt engineering, the AI generates precise, mining-specific responses from operational data. The NLP pipeline efficiently processes text and voice inputs, converting them into structured queries, while the response generation system transforms raw KPI data into natural language insights using OpenAI's completion endpoints.

The mobile application ensures cross-platform compatibility and native performance. It features voice-to-text conversion and an intuitive UI that presents complex mining metrics in easily

understandable formats. Real-time data synchronization capabilities ensure that KPI reporting remains current and accurate.

The data processing pipeline incorporates custom ETL processes to extract data from various mining operations sources. A Python-based transformation layer standardizes metrics across different mining sites. Caching mechanisms optimize access to frequently requested KPI data, while built-in data validation ensures the accuracy of metrics before AI processing.

Security and integration features include secure API endpoints with robust authentication and encryption for sensitive operational data, complemented by a role-based access control system that manages user permissions at multiple levels.

Key Features

- Users can query specific operational metrics using natural language, reducing the need for manual navigation through the reporting system.
- Voice search feature enables hands-free access to KPI data, improving accessibility and efficiency.
- Generates concise summaries of operational data, highlighting trends and key performance areas across different timeframes.
- Interacts with the client's existing data infrastructure via REST APIs, ensuring real-time updates and accuracy.
- High-level business insights presented to senior management, government officials, and operational leads through the mobile interface.
- Scalable design to enable future enhancements such as advanced data analytics and predictive insights.

Tools and Technologies

OpenAI

Flutter

Python

REST APIs

MySQL

Business Benefits

- Accelerated executive decision-making with instant voice and text access to critical KPIs, saving 15-20 hours per week previously spent navigating complex database systems.
- Reduced operational costs through automated reporting and data processing, saving an estimated 100+ person-hours monthly while minimizing training requirements for new users.
- Enabled smarter strategic planning with comprehensive access to historical trends and real-time performance metrics across all mining sites, supporting data-driven growth decisions.
- Minimized risks through automated data processing, standardized reporting, and maintenance of a comprehensive audit trail.
- Strengthened regulatory compliance and stakeholder relationships by providing instant, standardized access to operational metrics for government audits and inspections in easy-to-understand formats.
- Paved the way for future innovation by establishing the infrastructure for advanced analytics, predictive insights, and AI-driven operational optimization across mining operations.