Driving Efficiency with Intelligent Drilling and Wireline Operations

How one oil and gas leader enhanced drilling and wireline operations with a customized system modernization platform from ZEDEDA

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Industry Overview

Technological advancements have ushered in a new era for the oil and gas industry: powerful computers and processing units are now capable of analyzing data directly at well sites, and the development of secure and predictable platforms has enabled on-site execution of critical applications. The industry is also increasing automation in decision-making, potentially leading to autonomous drilling and the use of artificial intelligence (AI) for enhanced decision support. Despite these advancements, the cost and complexity of dispatching skilled personnel to drilling sites and the deployment and management of the applications used to analyze data across diverse locations remains an obstacle.

The oil and gas industry demands an edge orchestration and management tool that can address both the evolving technological landscape, and the unpredictable nature of edge drilling and wireline operations, while ensuring efficient, safe, and environmentally responsible operations.

This case study delves deeper into one company's innovative approach to tackle these challenges while prioritizing long-term sustainability within the oil and gas industry, paving the way for a more efficient future.

Challenge

A global oilfield service company on a digital transformation journey was looking to overhaul its drilling technology, systems and operations. Powered by Microsoft Windows VM, this legacy software had been critical to the company's success for more than 20 years. Like many companies with lengthy histories, the oil and gas leader was hesitant to take significant risks that could potentially lead to a complete system failure and loss of customer trust and was balancing the need for drill ops modernization with maintaining the functionality and reliability of their core system.

The company had already begun rebuilding its drilling operations to reduce labor intensity and address the complex, often manual coordination of personnel and equipment, along with adherence to strict safety and environmental protocols. Having focused on its approach to drilling planning and orchestration, the energy company was ready to move on to automation.
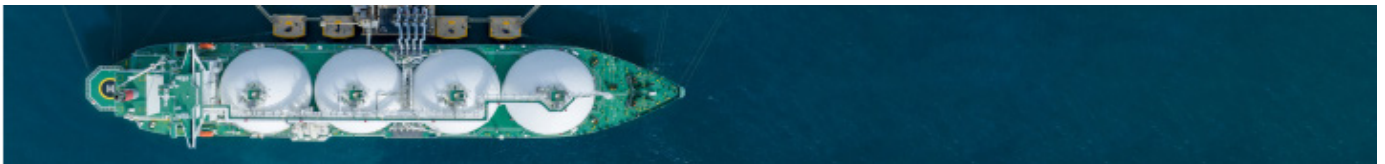
Specifically, they were looking to:

- Modernize legacy systems and infrastructure and automate drilling processes via a phased approach

- Leverage technology and AI to automate various drilling tasks that had traditionally been done manually

- Improve efficiency, safety and adherence to environmental standards

At the same time, the oilfield service provider needed to address several challenges related to its nearly 100-year-old legacy wireline technology in order to expand beyond traditional wireline services to offer more efficient solutions. Not only had the company accumulated a lot of intellectual property inside its highly specialized well applications, their team of skilled technicians–who were responsible for staying up to date with all the wireline technology and applications–were responsible for going from customer well to customer well to collect raw data and then carry that data to a well site to analyze it and produce reports. The company realized that this operations model was no longer sustainable as it lacked flexibility and put a strain on its limited technical resources. As a result, the company set out to:

- Modernize wireline operations while enabling new technology and applications to work side by side with legacy systems

- Enable remote, centralized data capture and transfer

- Streamline remote well management to ensure technical staff can adapt to new wireline systems

Leveraging its proven edge orchestration and management platform and years of expertise in the oil and gas industry, ZEDEDA stepped in to help the energy leader solve its drill ops and wireline challenges. Before engaging ZEDEDA, however, the company had tried a number of iterative system modernization experiments in a controlled lab environment to avoid impacting oil production. Though some of these tests resulted in minimal improvements, the company was able to capture and pass on several learnings to inform future solutions, while minimizing disruption.

Solution

To address the customer's drill ops challenges, ZEDEDA customized a purpose-built solution, leveraging ZEDEDA's edge orchestration and management platform, which was specifically designed for oil and gas drilling activities at the edge. ZEDEDA's solution for the energy leader provides:

- **Centralized orchestration**: Enables central policy creation and deployment across all locations, allowing skilled personnel to focus on mission-critical tasks.

![ZEDEDA logo]

- **Comprehensive monitoring**: Offers centralized monitoring for increased efficiency and cost optimization.

- **Open architecture**: Supports various hardware, GPUs, and software technologies (virtual machines, containers, Kubernetes), allowing for future flexibility and customization.

- **Pre-built services**: Includes pre-built services like remote access, security, and connectivity, enabling faster implementation and reduced development time for oil and gas architects.

- **Scalability**: Manages thousands of geographically dispersed assets with minimal hardware at each site.

- **Connectivity independence**: Operates seamlessly across diverse connection types (fiber, satellite) with fluctuating bandwidths, and maintains connectivity even in air gapped environments or during extended outages.

- **User experience simplicity and consistency**: Provides an intuitive and standardized experience for on-site personnel regardless of location or connectivity and without requiring deep IT knowledge.

- **Enhanced security and safety-first design**: Integrates robust security protocols to safeguard sensitive data and intellectual property and incorporates comprehensive safety workflows for personnel and equipment operation.

To enable the customer to modernize its wireline operations, including running both legacy and advanced applications and workloads on remote trucks, ZEDEDA provided the following solutions:

- **Remote management and control**: Enables the customer to remotely manage all software and workloads running on the trucks, including controlling which programs are running, troubleshooting any issues that arise, and accessing data generated by the workloads. By enabling remote management, the customer can also reduce the number of devices and servers needed on the trucks, which are expensive and difficult to maintain.

- **Running mixed workloads**: Allows for running both legacy applications like old Windows programs and advanced technology and AI-powered applications running in containers

- **Hardware and storage flexibility**: Enables heterogeneous hardware to ensure the customer can work with a variety of USBs and GPUs, for advanced storage and processing complex data. The new system can also handle large sites requiring data redundancy and smaller sites where redundancy may not be necessary

- **Remote network connectivity**: Overcomes unpredictable connectivity in remote areas, air gapped environments or during long periods of downtime when network connectivity is unavailable. Satellite internet provides constant connectivity for devices on the truck, ensuring data flows uninterrupted.

- **Scalability to multiple sites**: Adapts to large well sites that may have more devices to manage, as well as smaller sites that require a simpler setup with fewer devices

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- **Customized workflows**: Workflows can be customized to accommodate various scenarios like disabling cloud communication when using explosives or remotely managing tasks in air-gapped environments, when applications need to be offline, or when internet connectivity is unavailable.

This customized platform from ZEDEDA prioritized drilling and wireline risk mitigation and user experience during the oilfield service provider's digital transformation, carefully considering any existing investments and customer needs during modernization. In addition, the iterative approach allowed for gradual changes and learning while minimizing disruption. Ultimately, the solution has empowered the company to modernize its drilling and wireline fleet and workloads, improve operational efficiency, and maximize its return on investment, all while prioritizing security, safety, and user experience.

Results

Following the implementation of ZEDEDA, the energy leader experienced increased efficiency, performance, and safety in both their drilling and wireline operations, enabling the company to make faster, more-informed decisions that have improved their bottom line.

Among the most notable benefits, the company can now maintain its drilling and wireline operations with a reduced team of drilling experts, eliminating the need for expertise to manage IT equipment and the workloads running on it.

The company's positive drilling and wireline operations outcomes include the following:

Drilling Operations

- **Reduced errors and spills**: Improved drilling accuracy and efficiency is expected to lead to fewer spills.

- **Reduced manpower**: Streamlined operations have enabled the company to achieve the same output with fewer personnel.

- **Increased drilling flexibility**: Automated processes enabled drilling at multiple sites without requiring extensive onsite expertise in remote locations.

- **Enhanced performance**: Overall drilling operations performance has been significantly improved.

Wireline Operations

- **Faster reporting**: Real-time data analysis enabled near-instantaneous well characterization reports instead of the previous month-long wait.

- **Faster decision-making**: Quicker access to data enabled timely decision-making for optimizing well management.

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- **Reduced costs**: Optimized resource allocation minimized the equipment and personnel needed for well characterization, leading to cost savings.

- **Improved flexibility**: The customized solution provided a more flexible approach to well characterization, adapting to different well sizes and needs.

- **Increased return on investment**: Streamlined operations and faster characterization have resulted in better return on investment.

Conclusion

Through careful planning, this energy leader embraced system modernization as a critical step toward increased efficiency, better performance, cost optimization, and long-term success.

Leveraging ZEDEDA's proven experience working with top oil and gas players, the company embraced proven technology and edge computing strategies to accelerate their modernization journey while mitigating risks often associated with trial and error. This proactive approach was essential in helping the company stay competitive in a landscape where optimizing workflows, reducing costs, and maintaining safety are paramount. Modernization also empowered the company to offer improved services to its customers at lower costs, paving the way for a more sustainable and competitive future.

By taking action today, oil and gas industry leaders can harness the power of modern solutions and secure long-term success.

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