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SYNERGIZING EDGE COMPUTING AND CLOUD INTEGRATION FOR ENHANCED EFFICIENCY IN THE OIL AND GAS INDUSTRY

Shivaprasad Sankesha Narayana [1]

[1] Senior Architect, SAIPSIT INC, United States.

Abstract

The oil and gas industry stands at the forefront of technological innovation, driven by the imperative to optimize operations, ensure safety, and mitigate environmental impact. In this digital age, leveraging advanced technologies has become essential for meeting these challenges effectively. Among the various technologies reshaping the industry landscape, edge computing and Cloud integration have emerged as indispensable tools offering transformative potential. This research article delves into the synergistic possibilities of integrating edge computing and cloud platforms within the oil and gas sector to propel efficiency to unparalleled levels.

The combination of edge computing and cloud integration enables a paradigm shift in how data is collected, processed, and utilized throughout the oil and gas value chain. Edge computing facilitates real-time data processing and analysis at the origin point, whether at remote drilling sites, offshore platforms, or transportation pipelines. Critical operational data can be captured and analyzed locally by deploying edge devices equipped with sensors and actuators, reducing latency and bandwidth constraints while ensuring timely decision-making. Meanwhile, cloud integration provides scalable storage, computational power, and advanced analytics capabilities, enabling centralized data management, collaboration, and insights generation across geographically dispersed assets.

This article highlights the multifaceted benefits of synergizing edge computing and cloud integration in the oil and gas industry through a comprehensive review of existing literature and case studies. From real-time monitoring and predictive maintenance to data fusion and safety compliance, integrating these technologies offers unparalleled opportunities for efficiency gains, cost reductions, and risk mitigation. Furthermore, the paper addresses critical challenges such as data security, interoperability, and scalability, providing insights into best practices and future research directions to overcome these hurdles.

Author Keywords

Edge Computing, Cloud Integration, Oil and Gas Industry, Efficiency, Digital Transformation

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