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Addressing Cybersecurity Risks in Multi Cloud Environments for Digital Transformation

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Abstract

The rapid adoption of multi cloud environments has become a cornerstone of digital transformation initiatives, offering enhanced scalability, flexibility, and operational resilience for modern organizations. Despite these benefits, the integration of multiple cloud service providers introduces complex cybersecurity risks that traditional security models are often ill-equipped to handle. This study aims to investigate the key cybersecurity challenges inherent in multi cloud architectures and to evaluate effective mitigation strategies that can ensure secure digital transformation. Focusing on critical risks such as data breaches, Identity and Access Management complexities, and inter-cloud data protection, the research employs a qualitative methodology that integrates case study analysis with a comprehensive literature review. The analysis identifies Zero Trust Architecture, end-to-end

data encryption, and automated security policy enforcement as leading approaches to address these challenges. Findings reveal that while multi cloud infrastructures significantly improve operational capabilities, they also elevate an organization's exposure to sophisticated cyber threats due to increased system complexity and heterogeneous configurations. Consequently, implementing proactive and multi-layered cybersecurity frameworks is essential for minimizing vulnerabilities and maintaining a consistent level of protection. The study concludes that organizations pursuing multi cloud strategies must adopt integrated monitoring systems and dynamic risk management practices to safeguard critical assets and ensure the long-term success of digital transformation efforts. © 2025 IEEE.

Author keywords

Cybersecurity; Mitigation; Multicloud; Trust; Zerotrust

Indexed keywords

Engineering controlled terms

Cloud computing architecture; Cloud security; Cybersecurity; Data privacy; Distributed cloud; Information management; Metadata; Network security; Risk management; Trusted computing

Engineering uncontrolled terms

Cloud architectures; Cloud environments; Cloud service providers; Cyber security; Digital transformation; Mitigation; Multi-clouds; Security modeling; Trust; Zerotrust

Engineering main heading

Risk assessment

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