

Title: Securing the Cloud Infrastructure: Investigating Multi-tenancy Challenges, Modern Solutions and Future Research Opportunities

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Abstract: Industry heavyweights like Microsoft, Amazon, and Google are at the forefront of the development and provision of cutting-edge and affordable cloud computing solutions, contributing to the widespread recognition of cloud computing. Without requiring direct human control, this technology provides network services, including data storage and computational power. But security becomes apparent as a major issue, hindering widespread adoption. The present study performs an extensive investigation to investigate security concerns related to cloud computing at several infrastructure levels, including application, network, host, and data. It examines significant issues that could impact the business model for cloud computing and discuss ways to solve security issues at every level that have been documented in the literature. The study identifies open problems, especially when considering cloud capabilities like elasticity, flexibility, and multi-tenancy, which create new problems at every infrastructure tier. Notably, it is found that multi-tenancy has a significant influence, contributing to security issues at all levels including abuse, unavailability, data loss, and privacy violations. The research ends with practical recommendations for additional studies targeted at improving overall cloud computing security. The results highlight the necessity of concentrated effort on mitigating security vulnerabilities resulting from multi-tenancy. This study makes a valuable contribution to the wider discussion on cloud security by identifying particular issues and supporting focused initiatives to strengthen the resilience of cloud infrastructure.

Keywords: Cloud Computing; Cloud Security; Multi-tenancy; Infrastructure Security; Application Security; Network Security

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