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Role of Fault-Tolerant Data Handling and Computational Reliability in Cloud Computing

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Abstract: *Fault tolerance and computational reliability have become central to the design and operation of modern cloud computing systems. As cloud environments increasingly support mission-critical, data-intensive, and real-time applications, the need for robust mechanisms that ensure uninterrupted service has intensified. This review synthesizes current advancements in fault-tolerant data handling, resilient storage architectures, checkpointing methods, distributed error detection, and reliability-driven scheduling algorithms.*

It examines how cloud service providers leverage redundancy, virtualization, replication, self-healing systems, and intelligent monitoring tools to enhance system dependability. Additionally, the paper discusses emerging paradigms such as AI-enabled reliability prediction, fog–cloud collaborative fault management, and blockchain-based resilience frameworks. Future research directions underscore the need for energy-efficient fault-tolerant techniques, lightweight recovery mechanisms, and reliability strategies for edge-dominated architectures..

Keywords*:* Data Handling, Cloud Computing, Computational Reliability