

Quantum Computing: Transforming Problem Solving in Computer Science

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Abstract. This article explores the potential of quantum computing as a transformative technology in the field of computer science. Quantum computers leverage the principles of quantum mechanics to solve complex problems much faster than classical computers. This paper discusses the latest developments, potential applications, and future directions of quantum computing. The research highlights how quantum algorithms can outperform classical algorithms in specific problem domains, such as cryptography and optimization. By understanding the capabilities and limitations of quantum computing, researchers and practitioners can better prepare for its integration into real-world applications.

Keywords: Quantum Computing, Quantum Algorithms, Cryptography, Optimization, Computational Paradigm

Introduction

Quantum computing represents a new paradigm in computational technology, offering the potential to solve problems that are currently intractable for classical computers. Unlike traditional computers that use bits, quantum computers use quantum bits or qubits, which can exist in multiple states simultaneously. This property enables quantum computers to perform complex calculations at unprecedented speeds. The field of quantum computing is rapidly evolving, with advancements in quantum hardware, algorithms, and error correction techniques. This paper provides an overview of the foundational concepts of quantum computing, examines recent breakthroughs, and discusses the implications for future research and applications.

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References

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