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Enhancing Computer Security through Advanced Encryption Techniques

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Abstract: *Quantum computing has advanced rapidly, posing a major threat to RSA, ECC, and other standard cryptographic techniques. The related research delves into encryption with advanced technology FrodoKEM a lattice-based quantum resistant algorithm implementation embedded into a Spring Boot framework for secure encryption and decryption. The study compares the three types of encryption systems: conventional (AES-256 and RSA-2048) and quantum-resistant in terms of performance, security and practicability.*

Setup overview and final compliance summary of both the encryption and decryption functions using the Bouncy Castle PQC library. These findings show that while FrodoKEM offers strong quantum security, signing this proof incurs significant computational overhead, especially with respect to key generation time (1200 ms vs.0063 ms for AES-256). FrodoKEM is much faster than RSA-2048 when it comes to encrypting data, but it is nonetheless slower than AES-256.

This study demonstrates the necessity of optimized quantum-sensitive encodings and discusses probable correlations including cloud computing, IoT security, regulatory conformity [15]. FrodoKEM is a strong candidate for future-proof encryption, but optimizations are still necessary before its deployment is practical. The quantum revolution of tomorrow brings with it a whole new set of challenges and the necessity for new solutions, highlighting the continuing role of post-quantum cryptography in our secure online lives..

Keywords: Advanced Encryption Techniques, Data Security, Quantum Encryption, Cybersecurity, Encryption Standards, FrodoKEM