

# Enhancing Data Security in Cloud Environment using Lossless Data Compression, Data Encryption and Data Hiding Techniques

Dr. Parvinder Singh<sup>1</sup>, Dushyant<sup>2</sup> and Pardeep Kumar<sup>3</sup>

<sup>1</sup>Professor, Dept. of CSE, Deenbandhu Chhotu Ram University of Science & Technology, Murthal, Sonipat (Haryana)

<sup>2,3</sup>Research Scholar, Dept. of CSE, Deenbandhu Chhotu Ram University of Science & Technology, Murthal, Sonipat (Haryana)

E-mail: <sup>1</sup>parvindersingh.cse@dcrustm.org, <sup>2</sup>er.dushyantlathwal@gmail.com, <sup>3</sup>pardeep.research@gmail.com

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**Abstract:** *The cloud environment is expanding along with the adoption of smart devices and IoT since user data is being stored there. However, the cloud environment's security falls short of expectations. To increase the security of the cloud environment, we used Huffman encoding to minimize the size of the user data before further reducing it using the binary stream counter approach, which counts the number of 0s and 1s and replaces them with their count values. We used the AES method to encrypt the data, created a digital signature to ensure data integrity, and then used the LSB steganography method to embed the encrypted data and digital signature into the cover image. When we extract the data from the cloud environment, we will utilize the Encryption Key + Huffman tree as our Key. This technique produced a lossless data size reduction and numerous security layers that will safeguard and maintain the integrity of the data.*