



**VASIREDDY VENKATADRI INSTITUTE OF TECHNOLOGY  
(Autonomous)**

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NBA Accredited: B. Tech Programs– CE | CSE | ECE | EEE | ME | IT  
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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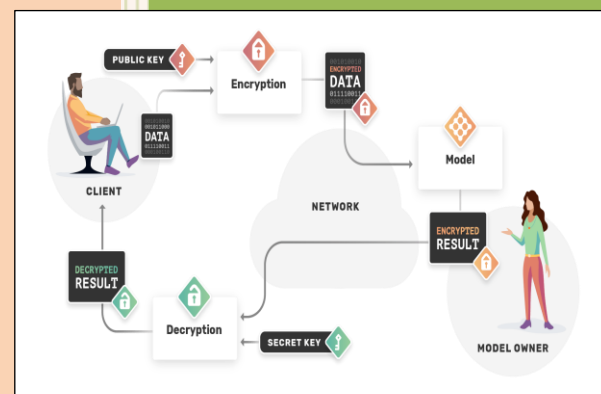
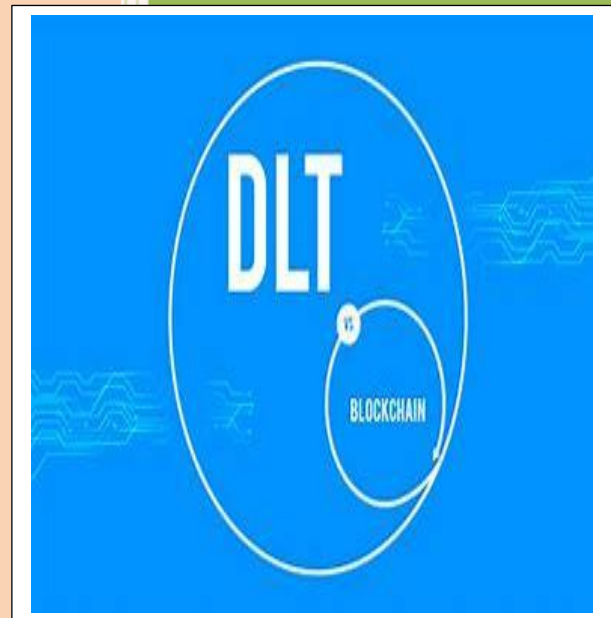
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### Blockchain and Distributed Ledger Technologies (DLTs)

## HOW WILL IT TRANSFORM OUR WORLD?

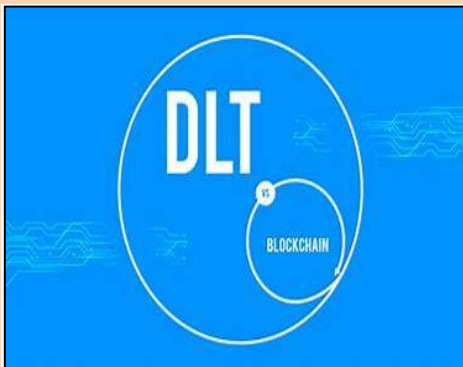
Blockchain and Distributed Ledger Technologies (DLTs) represent innovative and decentralized approaches to recording and managing data. These technologies gained prominence with the introduction of cryptocurrencies like Bitcoin. Blockchain is a type of DLT, and both terms are often used interchangeably, but it's essential to understand that not all DLTs are necessarily blockchains.

#### Blockchain:

Blockchain is one type of a distributed ledger. Distributed ledgers use independent computers (referred to as nodes) to record, share and synchronize transactions in their respective electronic ledgers (instead of keeping data centralized as in a traditional ledger). Blockchain organizes data into blocks, which are chained together in an append only mode.

#### DLT:

Distributed ledger technology (DLT) could fundamentally change the financial sector, making it more efficient, resilient and reliable.



#### Working of Blockchain:

##### Decentralization:

Unlike traditional centralized systems where a single entity has control, blockchain operates on a decentralized network of computers (nodes). Each node on the network has a copy of the entire blockchain, ensuring that no single point of failure exists.

##### Consensus Mechanism:

To validate and add new transactions to the blockchain, nodes must reach a consensus. Common consensus mechanisms include Proof of Work (used by Bitcoin) and Proof of Stake, among others.

##### Cryptography:

Cryptographic techniques, such as hashing and digital signatures, are used to secure transactions and control access to the blockchain.

Hash functions create unique identifiers for each block, and digital signatures ensure the authenticity of transactions.

#### Working of DLTs

##### Peer-to-Peer Network:

DLTs operate on a peer-to-peer network where participants (nodes) communicate directly with each other.

##### Consensus Mechanism:

Similar to blockchain, DLTs use consensus mechanisms to agree on the state of the ledger. Different DLTs may employ various consensus algorithms to validate transactions.

**Data Distribution:**

Instead of a single, linear chain of blocks, DLTs may organize data in different structures, such as graphs or distributed databases.

**Permissioning:**

DLTs can be permissionless (open to anyone) or permissioned (restricted access), depending on the use case.

**Benefits:**

- 1) DLT has the potential to transform various other sectors as well, like manufacturing, government financial management systems and clean energy.
- 2) Allowing two parties to operate without the oversight or the intermediation of a third party.
- 3) Dramatically increasing the speed of transaction processing.
- 4) Reducing or even eliminating counterparty risk.
- 5) Enabling new business models.
- 6) Tokenization of assets (including collaterals).
- 7) Possibility of transferring digital assets.
- 8) Preventing double-spending and forgery.
- 9) Rendering payments and other processes automatic.

10) Reducing paper waste.

11) Introducing a new approach to identity management.

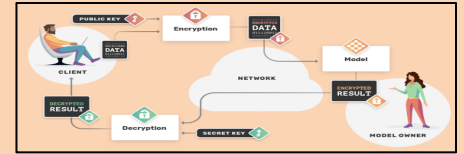
**Challenges:**

- 1) Scalability Challenges
- 2) Regulatory and Legal Uncertainty
- 3) Governance and Consensus Issues
- 4) Energy Consumption



**Article By  
Dr. P. Srinivasa Rao  
Assoc.Prof.**

# Homomorphic Encryption



## What is Homomorphic Encryption?

Homomorphic encryption is a cryptographic method that returns an encrypted result to the data owner. Essentially, this enables third parties to process encrypted data while having no knowledge about the data or the results.

Homomorphic encryption is a cryptographic technique that allows computations to be performed on encrypted data without decrypting it. This means that data can be kept confidential even while being processed. This is particularly important in scenarios where privacy and security are paramount, such as in cloud computing, data outsourcing, and other situations where sensitive information needs to be analyzed or processed.

### There are three main types of homomorphic encryption

- **Partially Homomorphic Encryption (PHE):** PHE only allows selected mathematical functions to be performed on encrypted data.
- **Somewhat Homomorphic Encryption (SHE):** SHE allows a limited number of mathematical operations up to a certain complexity to be performed, for a limited number of times.
- **Fully Homomorphic Encryption (FHE):** FHE allows any kind of mathematical operation to be performed for an unlimited number of times.

### Working

- The process starts with data in its decrypted form (i.e., plain text). The owner of the data wants some other party to perform a mathematical operation (e.g., some function, or a machine learning (ML) model) on it without revealing its content.
- The owner encrypts the data with a public key and sends it to the other party.
- The other party receives encrypted data (i.e., cipher text), performs operations on it, and sends the encrypted result to the owner.
- The owner of the data decrypts it with a private key and reveals the result of the intended mathematical operation, which is identical to the result if the unencrypted data had been used.

## Benefits of homomorphic encryption

- **Allows secure and efficient cloud use:** Homomorphic encryption can allow businesses to leverage cloud computing and storage services securely. It eliminates the trade-off between data security and usability. Businesses don't have to rely on cloud services regarding the security of their private data while retaining the ability to perform computations on it.
- **Enables collaboration:** HE enables organizations to share sensitive business data with third parties without revealing the data or the results of the computation to them. This can accelerate collaboration and innovation without the risk of sensitive information getting compromised.
- **Ensures regulatory compliance:** HE can allow businesses operating in heavily regulated industries, such as healthcare and finance, to get outsourcing services for research and analytical purposes without the risk of non-compliance.

## Challenges

**Computational Overhead:** Homomorphic encryption can be computationally expensive, especially fully homomorphic encryption, which involves complex mathematical operations.

**Key Management:** The management of encryption and decryption keys is crucial. If the keys are compromised, the security of the entire system is at risk.

**Performance:** While advancements have been made, the performance of homomorphic encryption is still a concern, and it may not be as fast as traditional, non-encrypted computations..



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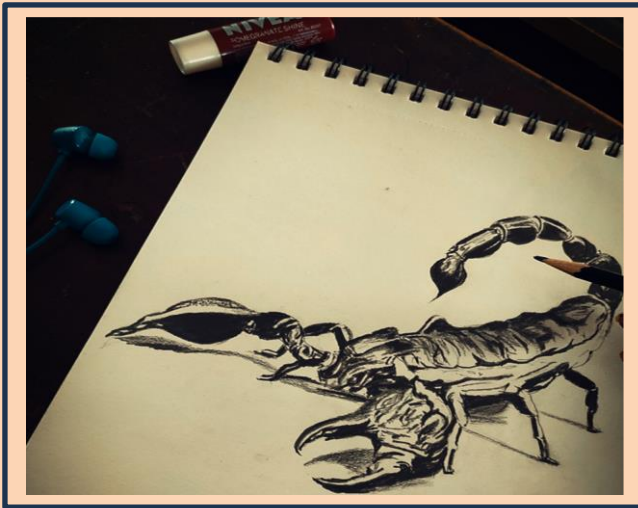




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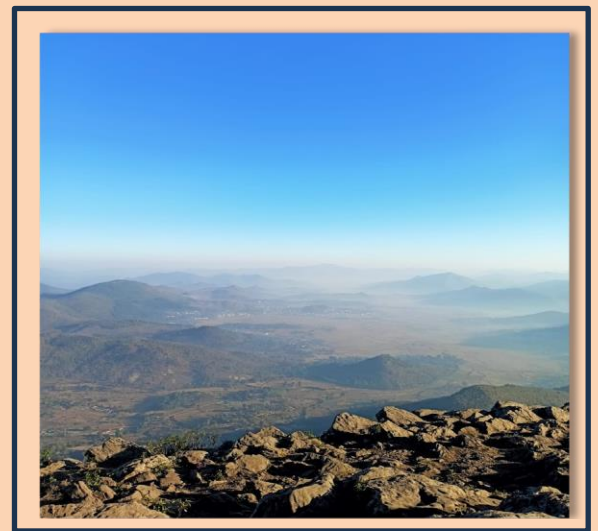
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**17BQ1A05L5**

**T. KRISHNA  
CHAITHANYA**

When I found out I got admission here, I was on cloud as finally I got a chance to live the hostel life. This college has been nothing less than what I had hoped for. Supportive seniors and faculty, beautiful campus, quality education, real world experiences, and amazing friends. its everything one needs from a college, and a network developed for life. The growth I have seen in myself due to VVIT, is invaluable. it has taught me things far beyond bookish knowledge and helped me broaden my horizons. not only do they conduct various technical quizzes and events, but also many nontechnical events as well, to test the all-round development of the students. Students are encouraged to take initiatives and hone leadership skills, so that they can cope with the world outside the campus.

There are numerous canteen facilities and the sports grounds keep the students physically active as well. The classes are very interactive and faculties ensure that every student understands what is being taught before proceeding. Courses are challenging, yet very informative, so that we don't feel lost when entering the competitive market. All in all, VVIT provides every student exactly what they need for life. Proud to be a part of VVIT.

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Thank you for giving me this opportunity to share my experience with our college.

My 4-year journey with lots of aspiration in my heart which came to reality when I finally got placed in campus drive. All of it was possible with the right direction provided by all the faculties right from the beginning of this journey. Different personality development sessions conducted in college helped in grooming a student to bring out a professional person.

VVIT gave me numerous chances to show and enhance my talent at every stage. Different aptitude sessions and timely assessment of the same, various GD sessions, mock interviews etc were conducted which gave me enough confidence to face and crack the recruitment process.



**17BQ1A05G6**

**P. TRINAGABINDU**



### **Department Vision:**

Providing quality education to enable the generation of socially conscious software engineers who can contribute to the advancement in the field of computer science and engineering.

### **Department Mission:**

1. To equip the graduates with the knowledge and skills required to enable them to be industry ready.
2. To train socially responsible, disciplined engineers who work with good leadership skills and can contribute for nation building.
3. To make our graduates proficient in cutting edge technologies through student centric teaching-learning process and empower them to contribute significantly to the software industry
4. To shape the department into a Centre of academic and research excellence

### **Program Educational Objectives (PEO'S):**

#### **PEO-1:**

To provide the graduates with solid foundation in Computer Science and Engineering along with the fundamentals of Mathematics and Sciences with a view to impart in them high quality technical skills like modeling, analyzing, designing, programming and implementation with global competence and helps the graduates for life-long learning.

#### **PEO-2:**

To prepare and motivate graduates with recent technological developments related to core subjects like Programming, Databases, Design of Compilers and Network Security aspects and future technologies so as to contribute effectively for Research & Development by participating in professional activities like publishing and seeking copy rights.

#### **PEO-3:**

To train graduates to choose a decent career option either in high degree of employability/Entrepreneur or, in higher education by empowering students with ethical administrative acumen, ability to handle critical situations and training to excel in competitive examinations

#### **PEO-4:**

To train the graduates to have basic interpersonal skills and sense of social responsibility that paves them a way to become good team members and leaders.