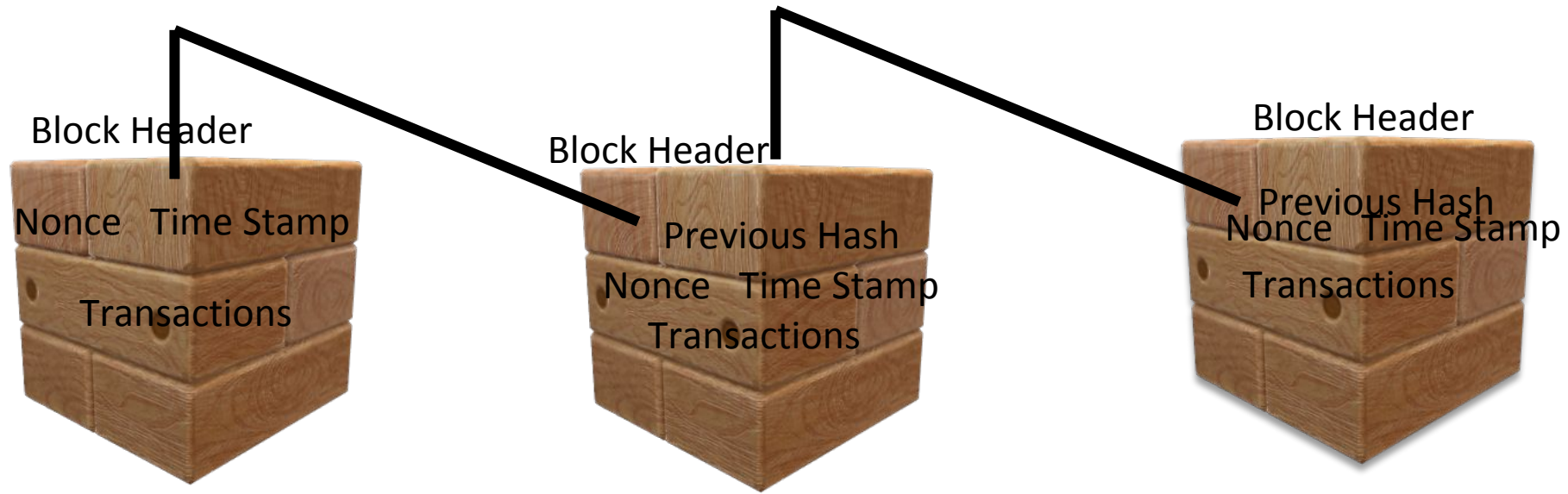


# Blockchain Architecture

**Dr. Preeti Chandrakar**

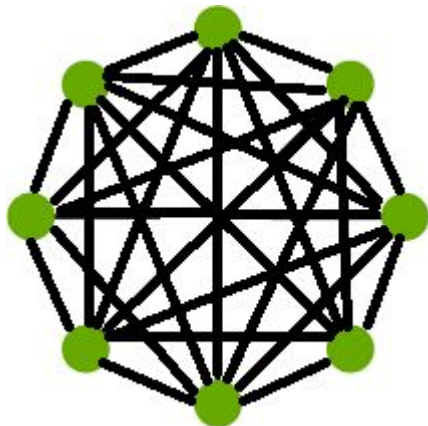
**Assistant Professor**

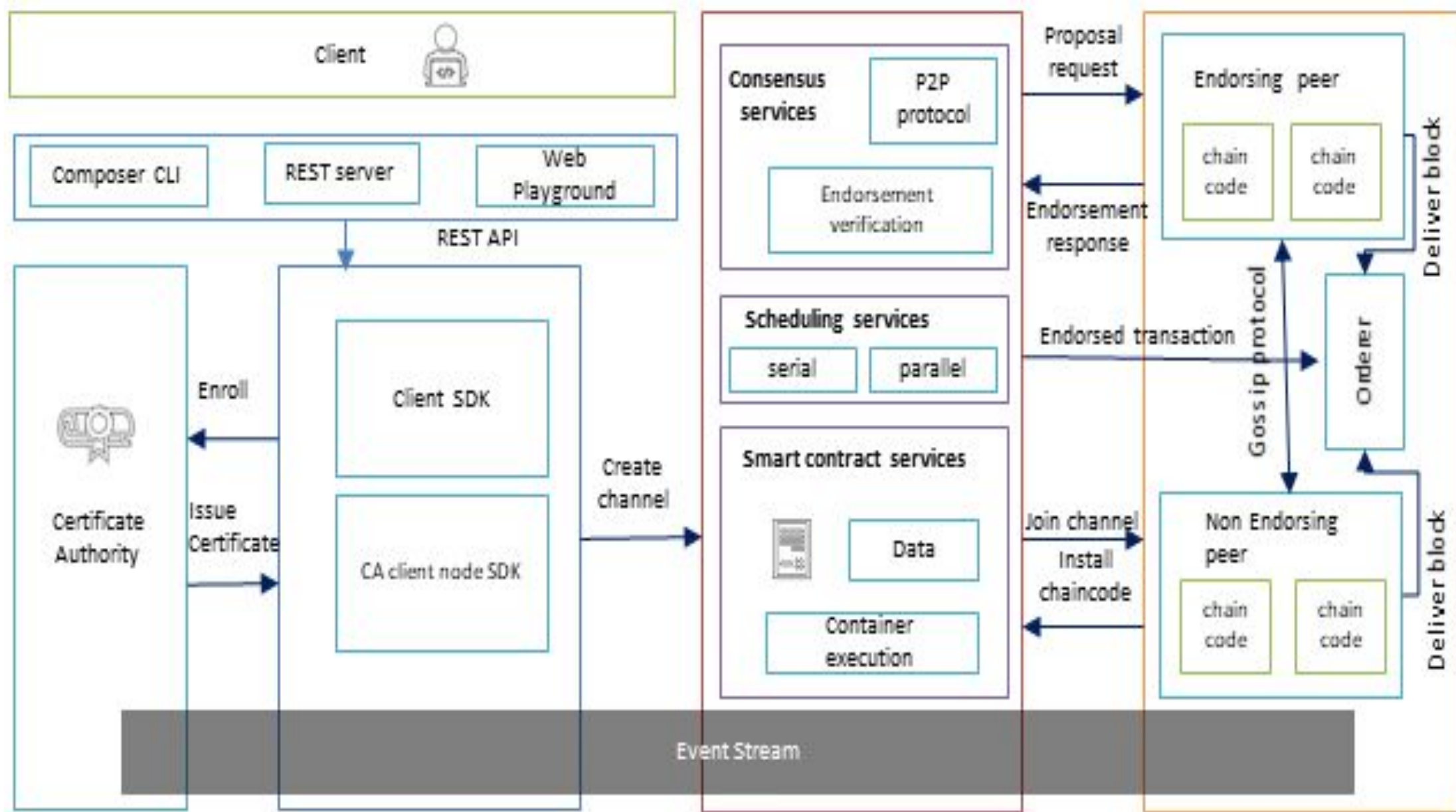
**Department of Computer Science & Engineering**



# Architecture Defined

- **A blockchain architecture**, the overall distribution works in complex ways, where each block distributes data across networks
- In a database, the systems are all set on similar data rules and conditions, it is therefore known as the shared state
- The entire operation in this architecture works on the three factors: **decentralization**, **liability**, and **protection**





# Definitions

- **Blocks**

blocks are data sets and contain valuable information as a block header that helps in its verification in a neighborhood

The information contained in the block header can be defined as:

- the current version of the block
- previous block header hash as a reference to the parent block
- an encrypted hash of all transactions taking place in this block known as Merkle root hash
- time of the block creation
- nBits
- nonce – any random number that is assigned by a block creator that can be changed as and when required

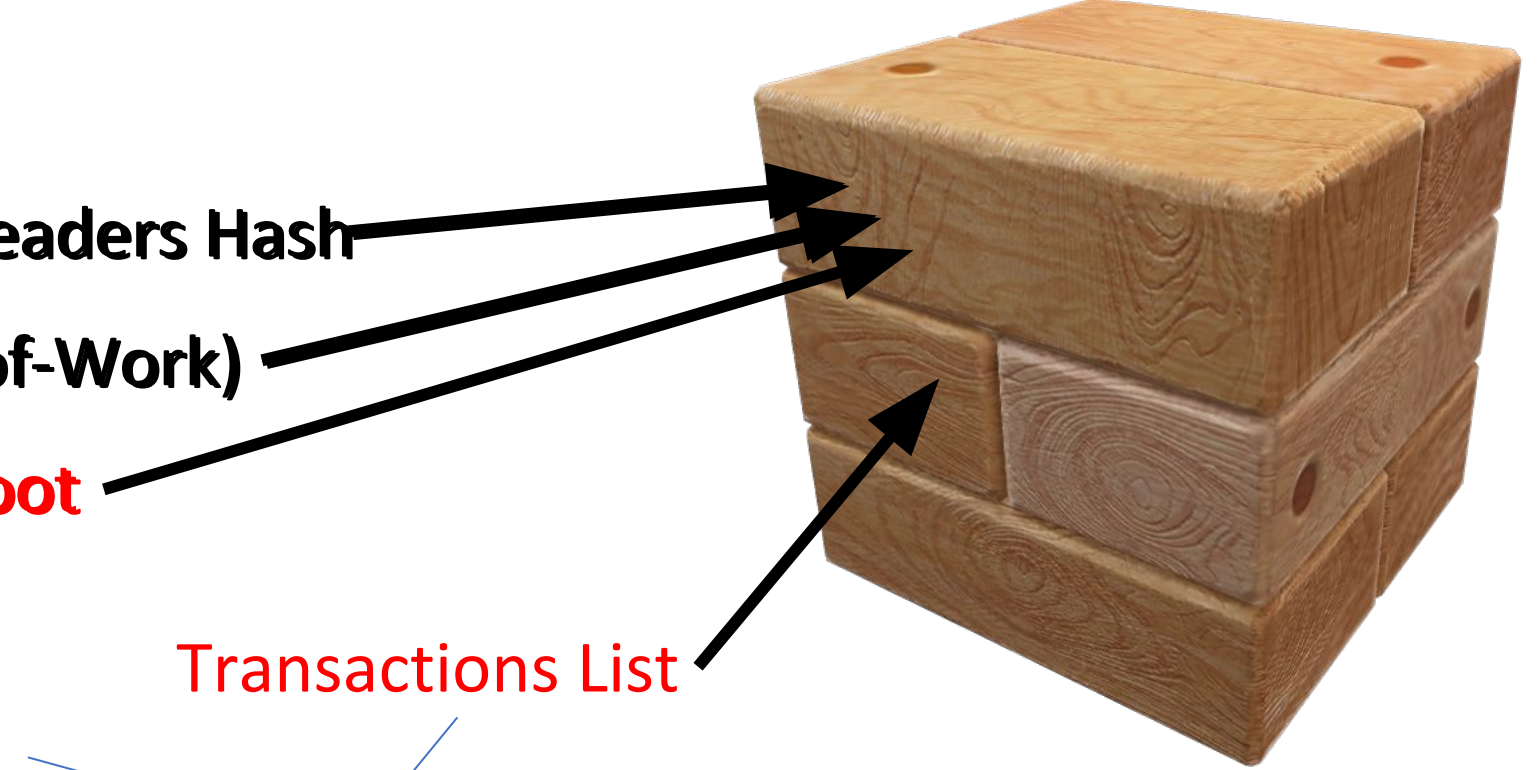
**Previous Block's Headers Hash**

**Nonce (Proof-of-Work)**

**Markle Root**

**Transactions List**

- Sjdghagduah.....
- Malkdajlsdnlas.....
- Kjofirjoie.....
- Jrgnejkghe.....



- The remaining part in a block consists of transactions set by the data miner to include in the block. In terms of the **blockchain architecture**, there are different types of blocks based on their functionalities:
- **Main branch blocks** – The ones that extend the main **blockchain network** in current use
- **Side branch blocks** – These refer to parent blocks that aren't present in the current **blockchain**
- **Orphan blocks** – These refer to parent blocks unknown to the node analyzing the current **blockchain**

# Transactions

- Containing the address of the recipient, sender, and respective values. It is the transactions that are collated and sent across nodes in blocks, which then get processed by each node individually
- It is this continuous movement of data that builds up the **blockchain architecture**. Each transaction can have single/multiple inputs and outputs. Here input means the reference value from a previous transaction, and output means the amount and address



# Mining

- Mining is what drives the **blockchain architecture** into working seamlessly. Their work is similar to that of the credit card processing network
- Here, each of the transactions waiting in the queue gets verified by the cross-checking of their values
- Once the transaction is deemed accurate, the transaction is packaged into relevant blocks and entered into the network

# Consensus

- It is the term that symbolizes the agreement of maximum nodes on the network having the same blocks in a validated **blockchain**
- It can be interpreted as a series of rules that each block self-enforces, in harmony.
- With an increase in the network, the miners and nodes create an overall consensus updating with newer nodes.

# Creating private blockchain architecture

- **Consensus algorithm:** In a consensus algorithm, a local copy of data available in every node is synced-in and updated.
- Since the values contained in the nodes are almost identical to each other, the consensus algorithm follows strict network rules.
- It all adds up to making the **blockchain network** more stable and secured, as tampering it via a third party would require manipulating all of its blocks.

# Putting the architecture together:

- For a **decentralized blockchain application**, the developmental design consists of its specifications and functionalities, UX/UI designs, as well as a robust architectural layout
- All of this combined will get you to configure the system flow of information between the users and the network
- **Blockchain network and blockchain code** are a few prerequisites for making your architecture

# Parties involved:

- Just like **blockchain**, the solutions developed from the same technology would require a network to function.
- Therefore, the system can be accessed and viewed by several employees, and therefore would need a transparent picture throughout the process.
- In the case of industries dealing with risk management, **blockchain** can prove to be a yielding tool for removing disruptions.