**CODELANDCS BLOCKCHAIN DEVELOPMENT SYLLABUS**

**WEEK 2**

**DAY 1**

**ETHEREUM ACCOUNTS**

Good afternoon everyone, today we will be discussing Ethereum accounts. Ethereum is a blockchain platform that was created to **enable smart contracts** and decentralized applications. It uses a native cryptocurrency called **Ether (ETH)** for transactions and incentivizing network participants.

We will explore the various types of Ethereum accounts, how they work, and how they differ from each other.

**Ethereum Accounts:**

An Ethereum account is an address on the Ethereum blockchain that holds Ether and other digital assets. There are two main types of accounts on the Ethereum network: externally owned accounts (EOA) and contract accounts.

**Externally Owned Accounts (EOA):**

Externally owned accounts are the most basic type of Ethereum account. They are **controlled by private keys** and are essentially equivalent to Bitcoin wallets. **EOAs can hold Ether,** as well as other Ethereum-based assets, such as **ERC-20 tokens.**

EOAs are used for regular transactions on the Ethereum network. When an EOA sends a transaction, the transaction is **signed** with the account's private key, which is then broadcast to the network and validated by miners. EOAs can also receive transactions, which are validated and stored on the blockchain.

**Contract Accounts:**

Contract accounts are more complex than EOAs. They are **created by smart contracts** and are **controlled by the code of the smart contract.** Contract accounts can hold Ether and other digital assets, and they can execute code when certain conditions are met.

Contract accounts can be thought of as autonomous agents that can perform actions on their own without the need for human intervention. They can also interact with other smart contracts and EOAs on the network.

There are two types of contract accounts on the Ethereum network: **"factory"** contracts and **"instance"** contracts. Factory contracts are used to create instance contracts, which are the actual smart contracts that perform actions on the network.

**How Ethereum Accounts Work:**

Ethereum accounts are stored on the blockchain as a collection of data fields. Each account has a balance, which represents the amount of Ether and other digital assets that the account holds.

When an account sends a transaction, it broadcasts a message to the network containing the transaction data and a signature of the transaction data using the account's private key. Miners on the network then validate the transaction and add it to the blockchain.

When an account receives a transaction, the transaction is validated and added to the blockchain, and the account's balance is updated to reflect the new transaction.

**Conclusion:**

In conclusion, Ethereum accounts are an essential part of the Ethereum network. They allow users to send and receive transactions, hold Ether and other digital assets, and interact with smart contracts on the network.

EOAs are controlled by private keys and are used for regular transactions, while contract accounts are controlled by the code of the smart contract and can execute code on their own.

**TRANSACTIONS IN ETHEREUM**

A transaction is an **action** that is executed on the Ethereum network. It involves the transfer of **Ether,** the cryptocurrency of Ethereum, from one account to another **or the execution of a smart contract on the Ethereum Virtual Machine (EVM).** Transactions are important because they are the building blocks of all activities that take place on the Ethereum network, including decentralized applications or DApps.

To better understand transactions in Ethereum, let us discuss the different components of a transaction. A transaction consists of the following:

**Sender Address -** This is the address of the account that initiates the transaction.

**Recipient Address -** This is the address of the account that will receive the transferred Ether or the smart contract that will be executed.

**Ether Value -** This is the amount of Ether to be transferred.

**Gas Price -** This is the fee that the sender pays to miners for processing the transaction.

**Gas Limit -** This is the maximum amount of gas that can be used to execute the transaction. Gas is the **unit of computation in Ethereum,** and it is required to execute any transaction or smart contract.

**Nonce -** This is a number that ensures that a transaction is executed only once. It is incremented for every transaction sent from an account.

Now that we know the components of a transaction, let us discuss the steps involved in executing a transaction in Ethereum. The following are the steps:

* The sender creates and signs the transaction using their private key.
* The sender sends the transaction to the Ethereum network.
* The transaction is broadcast to all nodes on the network.
* Miners on the network pick up the transaction and add it to a block.
* The miners compete to solve a cryptographic puzzle to add the block to the blockchain.
* Once the block is added to the blockchain, the transaction is considered confirmed and the recipient receives the transferred Ether or the smart contract is executed.

It is important to note that the time it takes for a transaction to be confirmed can vary **depending on the network congestion and gas price** paid. The higher the gas price, the faster the transaction will be processed by the miners.

In addition to transferring Ether, transactions can also be used to execute smart contracts on the Ethereum network. Smart contracts are self-executing programs that run on the EVM. They allow for the creation of decentralized applications or DApps that can automate complex transactions and business processes.

To execute a smart contract, the transaction must include the address of the smart contract and any required parameters. Once the transaction is confirmed, the smart contract will execute according to its programmed instructions.

In conclusion, transactions are an essential component of the Ethereum network. They allow for the transfer of Ether and the execution of smart contracts. Transactions consist of several components, including the sender and recipient address, Ether value, gas price, gas limit, and nonce. The process of executing a transaction involves creating and signing the transaction, broadcasting it to the network, confirming it with miners, and adding it to the blockchain. Transactions in Ethereum enable the creation of decentralized applications that can automate complex transactions and business processes.