# Assignment No. 01

Title :-

Installation of metamask and study Spending Ether per Transaction.

Objective:-

Understand and explore the working of Blockchain Technology and its applications.

Outcome :-

CO6 : Interpret the basic concepts in Blockchain technology and its applications.

Theory :-

1. Introduction

metamask is a plug-in Ethereum crypto wallet for chrome onboard users. Available as a browser extension and as a mobile app, metamask equips us with a key vault, secure login, and token wallet everything we need to manage our digital assets. Metamask provides the simplest yet most secure way to connect to blockchain-based applications.

2. Metamask Setup

complete information and study guide about Metamask can be found at its official website metamask.io. We need to choose the right browser (chrome is recommended) and follow its installation instruction. When we are creating a new metamask account, here are some key points we need to pay attention to.

first of all, creating a new strong password is extremely important because it encrypts private key.

Private keys give access to all of our Ether or other tokens. So, it is better to have a strong password here.

Secret Backup Phrase, which includes 12 mnemonic words, will pop out after setting up the password. We need to write this phrase on a piece of paper or store it in a secure location because secret backup phrase makes easier to back up and restore our account if we log out our account or accidentally clear browser history.

We are now able to use interact with metamask.

Conclusion :-

Successfully created metamask wallet, We have successfully studied the installation of metamask.

# Assignment No. 02

Title :-

Create your own wallet using metamask for crypto transactions.

Objective :-

(i) Concept of metamask
(ii) Own wallet using metamask for crypto transactions.

Theory :-

Introduction

metamask is an open-source, straightforward, and easy-to-use cryptocurrency wallet. It functions as a web browser extension available for chrome, firefox, Brave, or a mobile application for iOS or Android. Initially, this wallet supported only Ether and ERC-20 tokens, and now it is compatible with ERC-721 and ERC-1155 tokens standards. Furthermore, metamask benefits include interaction with websites; hence, it can function as a connection node for various DApps on Ethereum.

How does the metamask wallet function?

As we mentioned above, the metamask cryptocurrency wallet employs the web3.js library to function. This library is a part of the official Ethereum product. The library was developed focusing on the requirements of web applications that could interact with the Ethereum blockchain and take advantage of all blockchain's benefits and functions.

Metamask is a cryptocurrency wallet for Ethereum and an instrument that helps to interact with DApps. Metamask connect the extension to the DApp so that to fulfill both tasks. When the application identifies the Metamask, it creates a connection, and the user can start using all the features of a specific application.

Extended functions set for metamask clone

(i) Linking an account
(ii) eCommerce integrations
(iii) Multilingual interface
(iv) Push notifications
(v) VIP support
(vi) QR scanner

Conclusion :-

We have successfully created our own wallet using metamask for crypto transactions.

# Assignment No. 03

Title :-

Write a smart contract on a test network, for bank account of a customer for following operations

(i) Deposit money
(ii) Withdraw money
(iii) Show balance

Objective :-

Understand and explore the working of Blockchain Technology and its applications.

Outcome :-

Interpret the basic concepts in Blockchain technology and its applications.

Theory :-

What Is a smart contract?

A smart contract is a self-executing contract with the terms of the agreement between buyer and seller being directly written into lines of code. The code and the agreements contained there in exist across a distributed, decentralized blockchain network. The code controls the execution, and transactions are trackable and irreversible.

Smart contracts permit trusted transactions and agreements to be carried out among disparate, anonymous parties without the need for a central authority, legal system, or external enforcement mechanism.

solidity

Solidity is an object-oriented programming language created specifically by the Ethereum Network team for constructing and designing smart contracts on Blockchain platforms. It's used to create smart contracts that implement bussines logic and generate a chain of transaction records in the blockchain system.

Steps to develop an Ethereum Smart Contract

Step 1 :- Create a wallet at meta-mask
Step 2 :- Select any one test network
Step 3 :- Add some dummy Ethers to your wallet
Step 4 :- Use editor remix to write the smart contract in solidity
Step 5 :- create a .solextension file
Step 6 :- A sample smart contract code to create ERC20 tokens
Step 7 :- Deploy your contract

Banking smart contract

(I) Account creation
(II) Deposit Amount
(III) Withdraw Amount
(IV) Transfer Amount
(V) send Amount to wallet

first need to add solidity compiler version
Then creating Banking contract,
now let's create variables or objects

Here userAccount will contain account for each registered account and userExists for account restrictions

Now create functions for each mentioned operations,

1. createAcc() functions : Here we create user account using boolean method by making userExists mapping true a after using createAcc() function

2. deposit() function : With the help of userExists mapping we are only allowing registered users to deposit into our smart contract Bank.

3. withdraw() amount function :

4. TransferAmount() function :

5. sendAmount() function : Here sender's amount will be transfered from account in the bank to other receiver's wallet.

Conclusion :-

In this way we study what is smart contract and how to write and deploy it.

# Assignment No. 04

Title :-

Write a program in solidity to create student data. Use the following constructs:

(i) Structures

(ii) Arrays

(iii) Fallback

Deploy this as smart contract on ethereum and observe the transaction fee and Gas values.

Objectives :-

Understand and explore the working of Blockchain Technology and its applications.

Theory :-

Solidity is an object-oriented, high-level language for implementing smart contracts. Smart contracts are programs which govern the behaviour of accounts within the Ethereum state.

Following are the some constructs of solidity:

1. Structures :

Struct

Structs in solidity allows you to create more complicated data types that have multiple properties. You can define your own type by creating a struct. They are useful for grouping together related data.

Syntax

```
struct <structure_name> {
    <data type> variable_1;
    <data type> variable_2; }
```

2. Arrays:

Arrays are data structures that store the fixed collection of element of the same data types in which each and every element has a specific location called index.

Creating an Array

To declare an array in solidity, the data type of the elements and the number of elements should be specified.

Syntax

<data type><array name>[size] = <initialization>

fixed-size Arrays

The size of the array be predefined. The total number of elements should not exceed the size of the array.

Dynamic Array:

The size of the array is not predefined when it is declared.

Array operations

1. Accessing Array Elements
2. Length of Array
3. Push
4. Pop

3. Fallback:

The solidity fallback function is executed if

none of the other functions match the function identifier or no data was provided with the function call.

Properties of a fallback function:

1. Has no name or arguments
2. If it is not marked payable, the contract will throw an exception if it receives plain ether without data.
3. Can not return anything.
4. can be defined once per contract.
5. It is also executed if the caller meant to call a function that is not available
6. It is mandatory to mark it external.
7. It is limited to the 2300 gas when called by another function. It is so for as to make this function call as cheap as possible.

Conclusion :-

In this way we studied what is smart contract and how to create smart contract for student data using different constructs.

# Assignment No. 05

Title :-

Write a survey report on types of blockchains and real time use cases.

Objective :-

1. Concept of types of Blockchains
2. Survey report on types of Blockchains and its real time use cases.

Theory :-

Introduction

Blockchain technology is being used to carry and transfer the transactions or exchange of information through a secure network. Blockchain technology and distributed ledger technology is used parallel to the digital cryptocurrency to the people. Blockchain is being used for the purpose of private networking and uses to where only the restricted network users can get the authorization and access. It is important to note that every kind of Blockchain basically consists of a cluster of nodes, and this is working on the peer-to-peer (P2P) network system.

Overview of Blockchain History

1991: In 1991, researcher scientists named Stuart Haber and W. Scott stornetta introduce Blockchain Technology.

1992: After that 1992, merkle Trees formed a legal corporation by using a system developed by Stuart Haber and W. scott stornetta with some more features.

2000: In the year 2000, stefan konst published his theory of cryptographic secured chains, plus ideas for implementation.

2004: Cryptographic activist Hal finney introduced a system for digital cash known as "Reusable Proof of Work".

2008: Satoshi Nakamoto conceptualized the concept of "Distributed Blockchain" in his white paper.

2009: Satoshi Nakamoto Releases Bitcoin white paper. A person named, James Howells was an IT worker in the United Kingdom, he starts mining bitcoins which are part of Blockchain in 2009 and stopped this in 2013.

2014: Blockchain technology is separated from the currency and Blockchain 2.0 is born.

2015: Ethereum frontier Network was launched.

2017: Japan recognized Bitcoin as a legal currency.

Types of Blockchain with real time use cases of each:

1. Public Blockchains:

① Bitcoin (BTC) - The first and most well-known cryptocurrency, used as a store of value and a medium of exchange.

2. Consortium Blockchains:

① R3 Corda: It's used by a consortium of banks for various financial applications, including trade finance and cross-border payments.

3. Private Blockchains:

① Corda : A platform for financial institutions to facilitate secure and private transactions.

4. Hybrid Blockchains:

① Dragonchain: Combines features of public and private blockchains, making it suitable for business looking to maintain some level of privacy while benefiting from public blockchain features.

Applications of Blockchain:

1. Cryptocurrency
2. Money Transfers
3. Financial Exchanges
4. Insurance
5. Secure Personal Information
6. Logistics and supply chain Tracking
7. Real Estate
8. Voting and Governance
9. Healthcare
10. Digital currencies

Conclusion:-

We have studied the survey report on types of Blockchains and its real time use cases.