BT

Group C
Assignment No: 01

Title of the Assignment: Installation of metamask & study spending Ether per transaction

Objective of the Assignment: students should be able to learn new technology such as metamask. Its appl^n & implementat^n

Prerequisite:
1. Basic knowledge of cryptocurrency
2. Basic Knowledge of distributed computing concept
3. working of blockchain.

Contents for theory:
1. Introduction Blockchain
2. Crypto currency
3. Transaction wallets
4. Ether transaction
5. Installation process of metamask.

Introduction to Blockchain:
- Blockchain can be described as a data structure that holds transactional records & while ensuring security, transparency & decentralization you can also think of it as a chain or records stored in the Forms of blocks which are controlled by no single authority.

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- Each transaction on a blockchain is secured with a digital signature that proves it authenticity. Due to the use of encryption & digital signatures, the data stored on the blockchain is tamper-proof & can't be changed.
- Blockchain technology allows all the network participants to reach an agreement, commonly known as consensus. All the data stored on a block chain is recorded digitally & has a common history which is available for all the network participants. This way, the chances of any fraudulent activity or ~~participants~~ duplication of transaction is eliminated without the need of a third-party.

Blockchain features

The following features make the revolutionary technology of blockchain stand out:

- Decentralized

Blockchain are decentralized in nature meaning that no single person or group holds the authority of the overall network. While everybody in the network has the copy of the distributed ledger with them, no one can modify it on his or her own.

- Peer to Peer Network:

with the use of blockchain the interaction betn two parties through a peer-to peer model is easily accomplished without the requirement of any third party. Blockchain uses P2P protocol which allows all the network participants to hold an identical copy of transactions, enabling approval through machine consensus.

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Immutable :

The immutability property of a blockchain refers to the fact that any data once written on the blockchain can't be changed. To understand immutable, consider sending email as an example. once you send an email to a bounch of people, you can't take it back. In order to find a way around, you'll have to ask all the recipients to delete your email which is pretty tedious.

Tamper – Proof

with the property of immutability embedded in blockchain it becomes easier of detect tampering of any data. Blockchains are considered tamper-proof as any change in even one single block can be detected & addressed smoothly. There are two key ways of detecting tampering namely, hashes & blocks.

Popular Appln of Blockchain Technology.

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Title : Write a program non-recursive

Benefits of Blockchain Technology

Time-saving: No central Authority verification needed for settlements making the process faster & cheaper.

cost-saving: A blockchain network reduces expense inseveral ways. No need for third-party verification. Participants can share assets directly.

Tighter security: No one can temper with blockchain data it is shared among millions of participants. The system is safe against cybercrimes & Fraud.

How to use metaMask : A step by step guide

MetaMask is one of the most popular browser extensions that servers as a way of storing your Ethereum & other ERC-20 Token. The extension is Free & secure allowing Web appl^n to read & interact with Ethereum blockchain.

step1 : Install MetaMask on your browser.
To create a new wallet, your have install the extension first Depending on your browser, there are different market places to find it. Most browsers have metaMask on their stores, so it's not that hard to see it, but either way here they are chrome, firefox & opera.

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- click on Install Metamask as a google chrome extension
- click add to chrome
- click Add Extension

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nd its as easy as that to install the extension on your browser, continue reading the next step to figure out how to create account.

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step2 : create an account

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- click on the extension icon in the upper right corner to open metamask.
- To install the latest version & be up to date, click Try it now
- click continue
- You will be prompted to create a new password. click create
- proceed by clickling next & accept the terms of use.

click Reveal secret words. There you will see a 12 words seed phrase. This is really important & usually

not a good idea to store digitally, so take your time & write it down.

- Verify your secret phrase by selecting the previously generated phrase in order. click confirm.

And that's it: now you have created your metamask account sucessfully. A new Etherenum wallet address has just been created for you. It's waiting for you to deposit has just been created for you. It's waiting for you to deposite funds & if you want to learn how to do that, look at the next step below.

Step 3 : Depositing funds :
- click on view Account.

You can now see your public address & share it with other people. There are some methods to buy coins offered by Metamask, but you can do it differently as well; you just need your address.
If you ~~every~~ ever logged out, you'll be able to log back in again by clicking the MetaMask icon, which will have been added to your web browser
You can now access your list of assets in the 'Assets' tab & view your transaction history of the in the 'Activity' tab.

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- sending crypto is an simple as clicking the 'send' button, entering the recipient address & amount to send & selecting a transaction fee. You can also manually adjust the transaction fee using the 'Advanced options' button, using information from ETH Gas station or similar platforms to choose a more acceptable gas price.

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What advantages does MetaMask have?

- Popular : It is commonly used, so user only need one plugin to access a wide range of dapps.

- Simple : Instead of managing private key, users just need to remember a list of words & transaction are signed on their behalf

- Saves Space : users don't have to download the Ethereum blockchain, as metaMask sends requests to nodes outside of the user's computer.

- Integrated : Dapps are designed to work with metaMask so it becomes much easier to send either in & out.

Conclusion : In this way we have explored concept blockchain & metamat wallet for transaction of digital currency.

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Group C
Assignment No-02

Title of the Assignment: create your own wallet using meta-mask for crypto transaction.

objective of the Assignment: students should be able to learn about cryptocurrencies & learn how transaction done by using different digital currency.

Prerequisite:
1. Basic knowledge of cryptocurrency
2. Basic knowledge of distributed computing concept
3. working of blockchain.

Contents for theory:
1. Crypto currency
2. Transaction wallets
3. Ether Transaction.

Introduction to cryptocurrency:
- Crypto currency is a digital payment system that doesn't rely on banks to verify transactions.
- It's a peer-to peer system that can enable anyone anywhere to send & receive payments. Instead of being physical money carried around & exchanged in the real world, crypto-currency payments exist purely as digital entries to an

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online database describing specific transactions.

- Cryptocurrency received its name because it uses encryptn. Verify transactn. This means advanced coding is involved in storing & transmitting cryptocurrency data betn wallets & to public ledgers.
- The first cryptocurrency was bitcoin, which was founded in 2009 & remains the best known today. Much of the interest in cryptocurrencies is to trade for profit, with spe at times driving prices skyward.

How does cryptocurrency work?

- Cryptocurrencies run on a distributed public ledger called blockchain, a record of all transactions updated & held by currency holders.
- units of cryptocurrency are created through a process called mining, which involves using computer power called mining, which involves using computer power to solve complicted mathematical problem that generate coins. users can also buy the currencies from brokers then store & spend them using cryptographic wallets.
- If you own cryptocurrency you don't own anything tangible what you own is a key that allows you to move a record or a unit of measure from one person to another without a trusted third party.
- Although Bitcoin has been around since 2009, cryptocurrencies & applⁿ of blockchain technology are expected in the future. Transactions including bonds, stocks & other financial assets could eventually be traded using the technology.

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Cryptocurrency examples: There are thousands of cryptocurrencies. Some of the best know include:

- Bitcoin: founded in 2009, bitcoin was the 1st cryptocurrency & is still the most commonly traded. The currency was developed by satoshi Nakamto - widely believed to be a pseudonym for an individual or group of peoped whose people whose precise identify remains unknown.

- Ethereum: Developed in 2015, Ethereum in a blockchain platform with its own cryptocurrency Ethereum. It is the most popular cryptocurrency after bitcoin.

- litecoin: The currency is most similar to bitcoin but has moved more quickly to develop new innovations, including faster payments & processes to allow more transaction.

- Ripple: Ripple is a distributed ledger system that way Founded in 2012. Ripple can be used to track different kinds of transactions, not just cryptocurrency. The company behind it has worked with various banks & financial institutions.

How to store cryptocurrency

- once you have purchased cryptocurrency, you need to store it safely to protect it from hacks. usually cryptocurrency is stored in cryptowallets, which are physical devices or online software used to store the private keys to

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your cryptocurrencies securely. Some exchange provide wallet services, making it easy for you to ~~store~~ store directly through the platform.

- There are different wallet providers to choose from. The terms "hot wallet" & "cold wallet" are used.

Hot wallet storage:

"Hot wallets" refer to crypto storage that uses online software to protect the private keys to your assets.

cold wallet storage:

unlike hot wallets, ~~said~~ cold wallets (also known as hardware wallets) ~~relg~~ rely on offline electronic devices to securely store your private keys.

Conclusion:

In this way we have explored concept cryptocurrency & learn how transactions are done using digital currency

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Group C

Assignment No :03

Title of the Assignment : Write a smart contract on a test network, for Bank Account of a customer for following operations: Deposit money, withdraw money, show balance.

objective of the Assignment : students should be able to learn about smart contract for banking applⁿ & able to perform some operation like deposite money, withdraw money show balance.

Pre-requisite :

1. Basic knowledge of smart contract
2. Remix IDE
3. Basic knowledge of Solidity.

contents for theory :

1. Smart Contract
2. Remix IDE
3. solidity Basics
4. Ether transaction.

- Smart contracts are self-executing lines of code with the terms of an agreement betⁿ buyer & seller automatically verified & executed via a computer network.

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- Nick Szabo, an American computer scientist who invents virtual currency called "Bit Gold" in 1998, I defined smart contracts as computerized transaction protocols that execute terms of a contract 2.
- smart contracts deployed to blockchains render transaction traceable, transparent & irreversible.

How does smart contract work?
first the contractual parties should determine the terms of the contract. After the contractual terms are finalized they are translated into programming code. Basically, the code represented a No. of different conditional statement that describe the possible scenaries of a future transactn

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- When the code is created it is stored in the blockchain network & is replicated among the participants in the blockchain

- Then the code is run & expected by all computer in network if a term of the contract is satisfied & it is verificed by all participants of the blockchain network, then the relevant transaction is executed.

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Remix IDE : Installation steps

- first & foremost, head on over on the release page of the official Remix Desktop repository & grab the binary suited for your host system. This will be the .exe file for windows users the .dmg for maco's & the .deb for Debain - derivative GNU / Linux systems for ubuntu & other AppImage setups, the AppImage will be what you are looking for.
- Go to https://remix-project.org/
- Go to IDE option. select Desktop IDE.

- select the file As per your choice.

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- Install Executable file, by double clicking on file. (Appln to exe file windows OS).

What is solidity?

- solidity is a rather simple language deliberately created for a simplistic approach to take real world soln Gavin wood initially proposed it in August of 2014 several developers of the Ethereum chain such as christan Reitwiessner, Alex Beregszaai, liana Husikyan, Yoich Hirai & many more contributed to creating the language.

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Solidity Basics

To get started with the language & learn the basis let's dive into coding. We will begin by understanding the syntax & general data types, along with the variable data types. solidity supports the generic value types, namely

- Booleans : Returns value as either true or false. The logical operators returning boolean data types are as follows:
- ! logical negation
- && logical conjunction, "and"
- || logical disjunction, "or".
- == equality
- != inequality.

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Integers :

solidity supports int/uint for both signed & unsigned integers respectively. These storage allocations can be of various sizes

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Keywords such as uint8 & uint256 can be used to all storage size of 8 bits to 256 bits respectively. By default, the allocation is 256 bits. That is, uint & int can be used in place of uint256 & int256. The operators compatiable with integer data types are:

- Comparisons: <=, <, ==, !=, >=, >. These are used to evaluate to bool.
- Bit operators: &, |, ^ bitwise exclusive 'or', ~ bitwise negation, "not"

The EVM returns a runtime Exception when the modulus operator is applied to the zero of a "divide by zero" operation.

Address: An address can hold a 20 byte value that is equivalent to the size of an Ethereum address. These address types are backed up with members that serve as the contract base.

String literals: string literals can be represented using either single or double quotes. unlike in the c language, string literals in solidity do imply trailing value zeroes. For instance, "bar" will represent a three byte element instead of four. Similarly, in the case of integer literals, the literals are convertiable in herently using the corresponding fit, that is, byte or string

Modifier: In a smart contract, modifiers are used to ensure the coherence of the conditions defined before

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executing the code.
Solidity provides basic arrays, enums, operators & hash values to create a data structure known as "mappings". These mappings are used to return values associated with given storage location.
Arrays can also be dynamically instantiated using the notation uint[][6]. Here the notation initialize a dynamic array with six contiguous memory allocation. similarly, a two dimensional array can be initialized as arr[2][4], where the two indicies point towards the dimensions of the matrix
We will begin our programming venture with a simple structure of a contract. consider the following code:

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- The word "program" refers to the instruction given to a compiler to sequentially execute the source code.

- Solidity is statically typed language. Therefore, each variables type irrespective of their scope can be instantiated at compile time. These elementary types can be further combined to create complex data types.

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steps Run Banking Appl^n :

1. // output steps
// Initially All Account has 100 fake either.

//Step 2 : click on Deploy button & contract created , can view under deployed

// After deploying contract 100 ETH turns to 99.9999 ETH

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//Step3 : set Manager : follow following instructions

//i. Select on other Address (eg. 0xAb8483F64d9C6d/ECFgb849Ae677dD3315835cb2)

//ii. Copy this address (eg. 0xAAb8483F64dgg9C6d1ECgb849b Ae677dD3315835cb2) & paste it in contract in front of set manager button

//iii. click on set manger button, Now

Manager = 0xAb8483F64d9C6d1ECFgb849Ae677dD3315835cb2

//step4: Join as client: follow following instructions.
//i. select on other Address (e.g. 0X4B20993BC481177EC7E8F571CECAE8Ae22C02db
//ii. Copy this address (eg. 0X4B20993BC481177EC7E8F571CECAE8Ae22C02db) contract, infront of JoinAs client button.
//iii. click on join As client button, Now.

//Initially Balance in contract will be 0ETH (can view in Deployed contract @ Bottom)
// step 5: Deposit:
//i select client Address (eg. 0XAb8983F64d9C6d1FCF9b849Ae677dD3315835Cb2)
//ii. Enter 10ETH amount in value field, select unit as ETH from drop down.
//iii. Come to the deployed contract, click on deposit button.
//iv. 10ETH transfer to contract, Balance will be update to 10ETH in contract
//v. 10ETH will be minus from clients wallet.

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Step 6 : withdraw

// i. selectclient Address (eg. 0xAb8983F64d9C6d1ECF9684 9Ae677dD33 15835cb2)

// ii. Enter 5 ETH amount in front of withdraw button.

// iii. click on withdraw button

// iv. 5ETH transper to wallet

// v. 5ETH will be Added to clients wallet.

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//step 7: send Interest:

//i. select Manager Address (eg. 0xAb8983F6dgC61ECF9b849 Ae6776D3315835Cb2)

//ii. come to contract, click on send Interest button

//iii. According to logic written in code. 1ETH as interest will be send to client wallet.

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//Step 8: get contract Balance:
//i. click on get contract Balance button to view total balance in contract.

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Group C
Assignment No-04

Title of the Assignment: Write a program in solidity to create student data. Use the following constructs:
- structures
- Arrays
- Fallback

Deploy this as smart contract on Ethereum & observe the transaction fee & gas values.

objective of Assignment: student should be able to learn about solidity. Its datatype

Prerequisite:
1. Basic Programmic logic
2. Basic knowledge of solidity.

Contents for Theory:
1 Solidity - Arrays
2 solidity - structures
3 Solidity - Fallback
4 Implementation.

1. Solidity - Arrays:
Arrays are data structures that store the fixed collection of elements of the same data types in which each &

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every element has a specific location called index. Instead of creating numerous individual variables of the same type, we just declare one array of the required size & store the elements in the array & can be accessed using the index.

Creating an Array.

To declare an array in solidity, the data type of the element & the No. of elements should be specified. The size of the array must be a positive integer & data type should be a valid Solidity type.

Syntax

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

Fixed - size Arrays:

The size of the array should be predefined. The total No. of element should not exceed the size of the array. If the size of the array is not specified then the array of enough size of the array is not created which is enough to hold the initialization.

Dynamic Arrays:

The size of the array is not predefined when it is declared As the elements are added the size of array changes & at the runtime, the size of the array will be determined.

Array operations

1. Accessing Array Elements:

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The element of the array are accessed by using the index. If you want to access i^{th} element ~~they then~~ you have to access $(i-1)$th index.

2. length of Array:
length of the Array is used to check the No. of elements present in an array. The size of the memory array is fixed when they are declared, while in case the dynamic array is defined at runtime so for manipulation length is required.

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3. push:
push is used when a new element is to be added in a dynamic array. The new element is always added at the last position of the array.

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4. pop:
pop is used when the last element of the array is to be removed in any dynamic array.

2) solidity - structures:
structs in solidity allows you to create more complicated data types that have multiple properties. you can define your own types by creating a struct. They are useful for grouping together related data.

structs can be declared outside of a contract & imported in another contract.

Syntax :

struct <structure (true-name)> {
<data type> variable-1;
<data typ> variable-2; }

3. solidity - 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. only one named function can be assigned to a contract & it is executed whenever the contract receives plain Ether without any data. To receive Ether & add it to the total balance of the contract, the fallback function must be market payable.

Properties of a fallback functn :

1. Has no name or argument
2. If it is not market 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 be executed if the caller meant to call a funⁿ that is not available
6. It is mandatory to make it external.
7. It is limited to 2300 gas when called by another function. It is so for as to make this function call as cheap as possible.

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4 Implementation.

Code –

```
pragma solidity ^0.5.0;
contract Crud {
    struct user {
        uint id;
        string name;
    }
    user [] public users;
    uinit public next Id =
    function create (string Memory name) public {
        users.push (user( nextId , name));
        next Id ++;
    }
    function Read (uint id) view public return (uint, string, memory) {
        for (uint i=0 , i<users.length; i++) {
            if (users [i].id = = id) {
                returns (users [i].id , users [i].name);
            }
        }
    }
    function update (uint id , string memory name) public {
        for (uint = 0; i<users .length ; i++) {
            if (users [i].id = = id) {
                users[i].name = name;
            }
        }
    }
```

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```
function delete (uint id) public {
    delete users [id];
  }
function find (uint id) view internal returns (uint) {
    for (uint i=0; <users-length; i++) {
     if(users [i] · id = = id) {
      return i;
     }
  }
// if user· data ~~des~~ does not exist then revert back we let (
"user does not exist");
  }
}
```

output

step 1 - compile the program by clicking on compile button.

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step2 : After the successful compilation, Deploy the contract to see the o/p.

step3 : Now you can check the o/p. you can insert, update & delete the student data using your smart contract.

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Step4 : After entering your data, you can read the data using ID.

Conclusion : In this way we have created array, structured & used fallback function in solidity.

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Group C
Assignment No-05

Title of the Assignment: Write a survey report on types of Block-chains & its real time use cases.

objective of the Assignmant: students should be able to learn about different use cases/ real time appl^n of Blockchain & perform survey on one of the case study.

1. Introduction of Blockchain:

Blockchain is a decentralized, distributed ledger technology that allow secure, transparent & tamper proof record keeping of transaction across multiple computers or nodes. It was originally introduced as the underlaying technology for Bitcoin by an anonymous entity known as Satoshi Nakamoto in 2008. since then blockchain has gained widespread attent^n for its potential in various industries beyond cryptocurrency, such as finance, supply chain management, healthcare, & voting systems

Key features of blockchain include:

1. Decentralization

unlike traditional database that are controlled by a central authority & blockchain operats by a central a peer-to-peer network where each participant has access to the entire ledger.

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2 Transparency :
Every transaction is recorded on the blockchain & can be viewed by all participants. The transparency helps ensure that almong uses.

3 Immutability:
once a transaction is recorded it can't be altered or deleted ensuring a secure & ~~tap~~ tamper history of all transaction.

4 smart contracts:
Insome blockchain such as Ethereum, smart contracts allow for self-executing contracts with the terms of the agreement directly written code, automating process without intermediaries

2 Types of Blockchain:
1. public Blockchain :
A completely open & decentralized blockchain where anyone can join, participate & verify transaction. These block chars typically use conserus mechanisms like proof of work or proof of stake.
Examples : Bitcoin, Ethereum

Use cases :
cryptocurrencies decentralized application (DAppS) voting, supply chain tracking
Advantages:
High transparency dementralized control, secure & tamperesist-ant.

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challenges: slower transactn speeds energy intersive, scalability issues.

2. Private Blockchain:
A permissioned blockchain where only specific authorized participants can access the network. These blockchain are typically ~~prog~~ manged by a single organization.

Example: Hyper ledgee corda.

Use Cases:
Internal data management financial system with an organization enterprise resource planning.
Advantage:
Greater control over participants, faster transaction processing suitable for business use.
challenge: centralized control reduces decentralization & transparency fewes participants.

3. Consortium Blockchain
A semi-decentralized blockchain where a group of organizatn manges the network rather than single entity Access & permissions are limited to specific participant like in a private

Example:
Energy web foundation.

Usecase:

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Banking & finance supply chain memagement healcare system.
Advantages:
Higher efficiency & speed than public blockchain decentralizat^n is maintained across multiple trust entities.
challenges:
Not as open an transparent as public blockchain still relies on tasted entities.

B] Different Application of Blockchain:
Blockchain technology has appl^n across many industries beyond its initial use in cryptocurrencies.

1. cryptocurrency & payments: Enables decentralized currencies & fast, low-cost global payment

2. Supply chain management: Track goods for transparency & traceability in supply chain.

3. smart contracts: Automal agreements using self executing code, removing intermediaries.

4. Healthcare: secure patient records & facilitates safe data sharing.

5. Voting systems: creates tamper proof transparent voting platform.

6. Digital Identity: secures digital identities & improves privacy.

7. Decentralized finance: provides financial services without traditional banks.

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4) Detail survey on use cases:
Here's a more detailed survey of blockchain use cases across different industries highlighting their potential benefit real world examples & the challenges they addressed.

1) Cryptocurrency & payment
Use case:
facilitating peer-to-peer digital transactions cryptocurrencies like Bitcoin & Ethereum without the need for tranditional financial intermediarce

Example:
Bitcoin: The first cryptocurrency enabling decentralized payment

Benfits
- faster & cheaper international payment
- financial inclusion for the unbanked
- High security & privacy in transaction.

challenges:
- Regulatory hardles
- price volalility of cryptocurries.

2) supply chain management:
Tracking goods from production to consumption ensure transparency & tracebility minimizing fraud, counterfeit product & inefficiencion.

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Example:
Vechain: used by companies like walmatel chain to track the authenticity & origin of productes.

Benefits:
- Increase consumer trust by verifying product again
- Helps detect fraud or counterfeit products.

challenges:
- Adoptn across multiple stakeholders in a global supply chain.

3) smart contracts:
Automating contract executn through code where predefined conditions, such as payments.

Example:
EOS: A blockchain platform designed for running industrial scale decentralized applN

Benefits:
- Remove intermedaries reducing costs.

conclusion:
We successfully write & study of a survey report on types of Blockchains its real time use cases.

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