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Principal.VJEC

VIMAL JYOTHI ENGINEERING COLLEGE

Department Of Computer Science Engineering
Presents

5 DAY TRAINING PROGRAM FOR FINAL YEAR CSE STUDENTS

ON

BLOCKCHAIN TECHNOLOGIES

Date : 04/03/2023 - 08/03/2023
5 day hybrid training program
(2 day online, 2 day offline and 1 day project).

Staff Coordinators
Mr. Rijin IK.
Ms. Diya Rameshan
Assistant Professor

Student Coordinators
Adheena KM
Aalap Ragesh
S8 CSE A

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Report on value added course

Block chain Technology

for

Final Year CSE (2019-23 BATCH)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

VIMAL JYOTHI ENGINEERING COLLEGE CHEMPERI

CHEMPERI P.O. - 670632, KANNUR, KERALA, INDIA

March 2023

Contents

Chapter 1

Introduction

An Add-on Course on Block chain Technology was organized from 4th March 2023 to 8th March 2023. It was a 5-day hybrid training program consisting of 2 days online and 3 days offline, and on the last day students got an opportunity to implement simple blockchain projects. The primary objective of this program was to make the Students familiar with the basics and recent advancement in Block-chain technology. Sessions were carefully designed to cover a lot of practical applications including industrial case studies and real-time applications. The training program was attended by 54 participants from Final year computer science and engineering. The speakers from both renowned industry and academia background shared their knowledge and experiences with participants.

On Day 1 (4th March): Session 1 on "Introduction to block chain" was delivered by Dr Jubilant J Kizhakkethottam (Professor, Department of computer science and engineering, Saintgits College of Engineering Pathamuttam). Session covered the BlockChain Technology History Process Lifecycle and its architecture along with its applications and challenges. The next session was delivered on the topic "Public-Key Cryptography, Hashing, Block, Markle Tree". The expert for the session was Mr. Thomas Joseph . He discussed the fundamentals of cryptographic hash functions and the basic structure of Markle Tree In his session, he also discussed various open-source tools, libraries and frameworks.

On Day 2 (5th March): First session was taken by Ms. Liz George She briefly explained different Tiers of Blockchain Technology and also discussed various aspects of blockchain technology like Public Blockchain, Private Blockchain, Semi-Private Blockchain and Sidechains. Session 2 was taken up by Dr Jubilant J Kizhakkethottam; he explained the concepts behind Bitcoin and Ethereum. He further introduced Smart Contracts, Consensus Model and Incentive Model– Metamask He concluded the session with various research areas in the field of block chain

On Day 3 (6th March): Session 1 & 2 addressed "Smart Contract Programming and Deployment of Ethereum Blockchain". The lecture was delivered by Dr Jubilant J Kizhakkethottam. He gave an overview on Solidity and further explained the applications and challenges of a smart contract.

On Day 4 (7th March): Session 1 & 2 addressed Building Dapp with Solidity The lecture was delivered by Mr. Hari M. He discussed the need for decentralization and compared BlockChain technology with distributed Ledger Technology. He concluded the session with various tools, libraries and frameworks that can be used to build decentralized applications with solidity.

On Day 5 (8th March): Session 1 was a project development session where students developed simple blockchain related projects. Session 2 was taken up by Mr Tibin He explained about the various career opportunities in the blockchain sector.

Chapter 2

Syllabus

Course Description

This course provides a broad overview of the essential concepts of blockchain technology by initially exploring the Bitcoin protocol followed by the Ethereum protocol to lay the foundation necessary for developing applications and programming.

Course Objective

1. To demonstrate a comprehensive understanding of the history, types, and applications of Blockchain technology
2. To acquire knowledge about cryptography and consensus algorithms.
3. To familiarize students with Bitcoin protocol followed by the Ethereum protocol to lay the foundation necessary for developing applications and programming
4. Students should be able to learn about different types of blockchain

Course Outcomes (CO)

1. Contentedly discuss and describe the history, types and applications of Blockchain
2. Gains familiarity with cryptography and Consensus algorithms.
3. Understand how Blockchain systems (mainly Bitcoin and Ethereum) work

4. Design, build, and deploy smart contracts and distributed applications.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	3	-	3	3	3	-	3	-
CO3	3	3	-	-	3	-	3	3	3	-	3	-
CO4	3	3	-	-	3	-	-	-	3	-	3	-

SYLLABUS:

Unit	Details	Hours
1	Introduction to block chain – History, Evolution and Definition, Public-Key Cryptography, Hashing, Block, Markle Tree	6
2	Tiers of Blockchain Technology- Blockchain 1.0, Blockchain 2.0, Blockchain 3.0, Types of Blockchain-Public Blockchain, Private Blockchain, Semi-Private Blockchain, Sidechains.	6
3	Bitcoin Blockchain- Structure, Operations, Features, Consensus Model, Incentive Model Ethereum Blockchain- Smart Contracts, Ethereum Structure, Operations, Consensus Model, Incentive Model– Metamask	6
4	Smart contract development- Introduction to development with Solidity, Development environments	6
5	Decentralized applications (Dapps)- Smart Contract Creation, Front-End Creation, Connecting Smart Contract with Front-End Application, Deploying Dapp, Validation, And Testing of Dapp.	6

Evaluation

Students are required to complete a project, based on which work marks are awarded

Max : 50 marks

The Passing marks required are 50%

Distribution of marks for the Project is as follows:

i Project Design : 20 Marks

ii Implementation : 20 Marks

iii Report : 10 Marks

Books:

1. Kirankalyan Kulkarni, Essentials of Bitcoin and Blockchain, Packt Publishing.
2. Anshul Kaushik, Block Chain Crypto Currencies, Khanna Publishing House.
3. Tiana Laurence, Blockchain for Dummies, 2nd Edition 2019, John Wiley Sons.
4. Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin,and popular Blockchain frameworks by Imran Bashir, Packt Publishing (2017)
5. Online Resources:
   - https://nptel.ac.in/courses/106105184/
   - https://swayam.gov.in/nd1_noc20_cs01/preview
   - ETHEREUM: A SECURE DECENTRALISED GENERALISED TRANSACTION LEDGER EIP-150 REVISION DR. GAVIN WOOD FOUNDER, ETHEREUM ETHCORE GAVIN@ETHCORE.IO

Chapter 3

Certificate

VIMAL JYOTHI
ENGINEERING COLLEGE
JYOTHI NAGAR, CHEMPERI – 670632, KANNUR, KERALA

CERTIFICATE

OF PARTICIPATION

This certificate presented to

For participating in

Hands-on training Block chain Technology
from 4th March 2023 to 8th March 2023

Mr. Rijin IK
Staff Coordinator

Ms. Divya B
Head of Deparment
CSE

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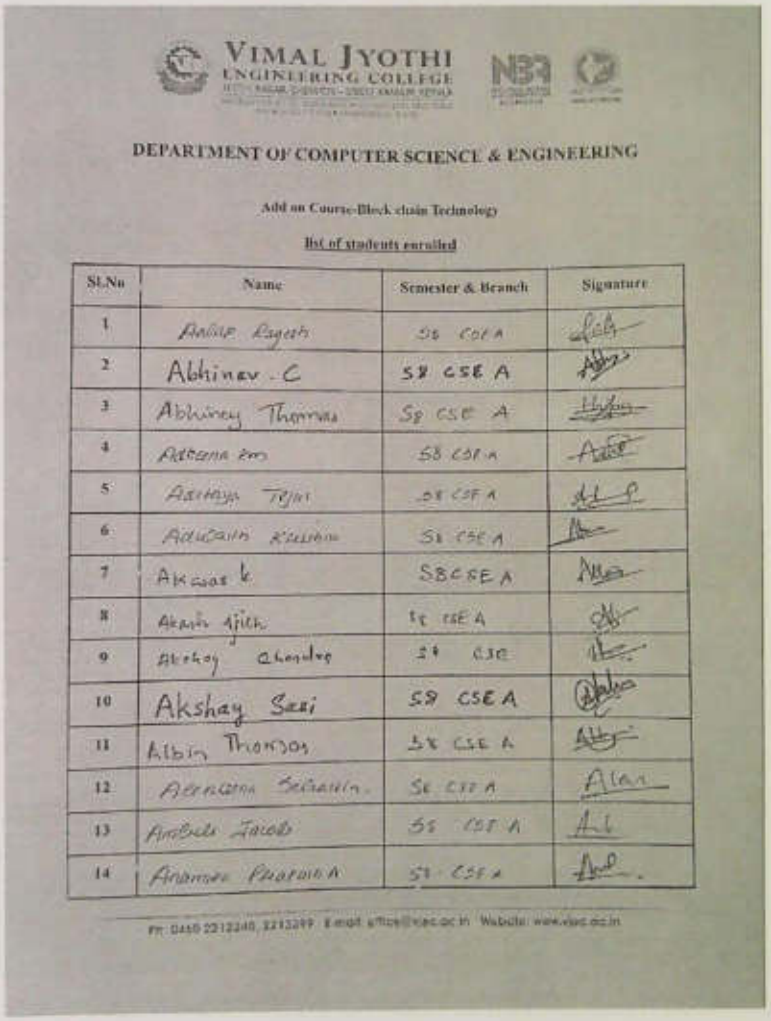
Principal.VJEC

Chapter 4

List of Students Enrolled



VIMAL JYOTHI ENGINEERING COLLEGE

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Add on Course-Block chain Technology

List of students enrolled

Sl.No	Name	Semester & Branch	Signature
1	Anjali Rajesh	S8 CSE A	
2	Abhinav C	S8 CSE A	
3	Abhinav Thomas	S8 CSE A	
4	Aiswarya [illegible]	S8 CSE A	
5	Aishwarya Teji	S8 CSE A	
6	Alwin [illegible]	S8 CSE A	
7	Akash k	S8 CSE A	
8	Akash Ajith	S8 CSE A	
9	Akshay [illegible]	S8 CSE	
10	Akshay Sasi	S8 CSE A	
11	Albin Thomas	S8 CSE A	
12	Aswathy Sebastian	S8 CSE A	
13	Anjali Jacob	S8 CSE A	
14	Anamika Pradeep	S8 CSE A	

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Rajan C.K

VIMAL JYOTHI ENGINEERING COLLEGE

15	Anjana Suresh	S8 CSE A	
16	Ann Rose Isaac	S8 CSE A	
17	Antony Thomas	S8 CSE A	
18	Anumitha S Pradin	S8 CSE A	
19	Anurag C Ashok	S8 CSE A	
20	Arjun K V	S8 CSE A	
21	Aswin Augustine	S8 CSE A	
22	Augustin Rahul	S8 CSE A	
23	Berly Xavier	S8 CSE A	
24	Drashitha K	S8 CSE A	
25	Dennis benny	S8 CSE A	
26	Dheeraj K	S8 CSE A	
27	Diya S	S8 CSE A	
28	EP GOPIKA	S8 CSE A	
29	Faez Muhammed	S8 CSE A	
30	Farzan Rahman	S8 CSE A	
31	Hariprasad M	S8 CSE A	
32	Harikrishnan P.V	S8 CSE A	

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33	Jestin Raju	S8 CSE A	
34	Joshua Mathew	S8 CSE A	
35	Keerthana	S8 CSE A	
36	Mahil Mathew Jiss	S8 CSE A	
37	Mohammad Razi Riyaz	S8 CSE A	
38	Muhsina Mustafa	S8 CSE A	
39	Nihal V George	S8 CSE A	
40	Nikhil Ramesh	S8 CSE A	
41	Poornami	S8 CSE A	
42	Rahnas KT	S8 CSE A	
43	Riya Rose	S8 CSE A	
44	Rose Mariya Joy	S8 CSE A	
45	Sahad Abdul Rahman	S8 CSE A	
46	Sangeeth K	S8 CSE A	
47	Shahan Abdullah K	S8 CSE A	
48	Shari Thomas	S8 CSE A	
49	Sharon Rose Babu	S8 CSE A	
50	Shinil Shaja	S8 CSE A	

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51	Shythya · PV	S8 CSE A	
52	Sidharthan AK	S8 CSE A	
53	Sidharth K·V	S8 CSE A	
54	Snigdha Sathyanathan	S8 CSE A	
55	Sona P	S8 CSE·A	
56	SREEHARI JAYESH	S8 CSE A	
57	Sruthi P K	S8 CSE A	
58	Uvais Hassan	S8 CSE A	
59	V.R Anya	S8 CSE·A	

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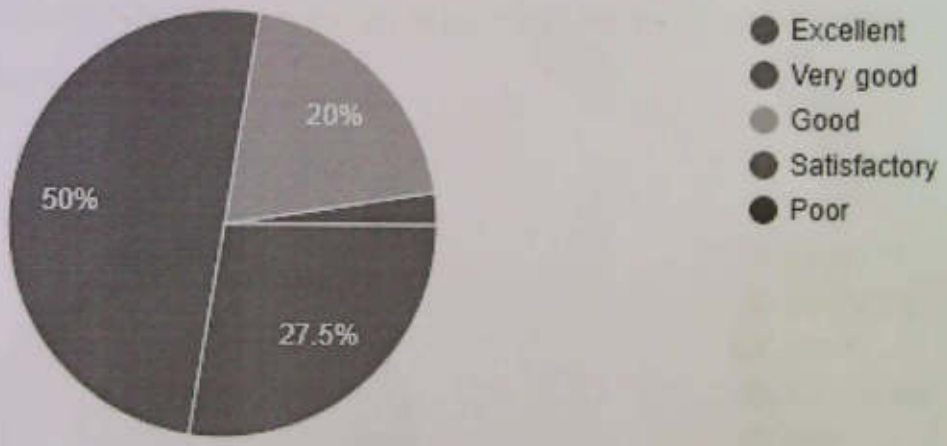
Chapter 5

Snippets

Chapter 6

Course End Survey

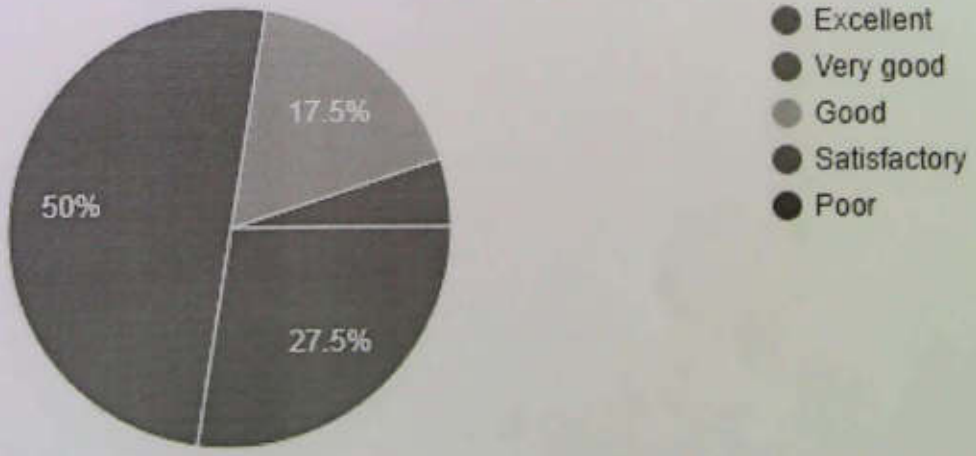
Level of knowledge gained from this training program to understand blockchain fundamentals to solve complex engineering problems:



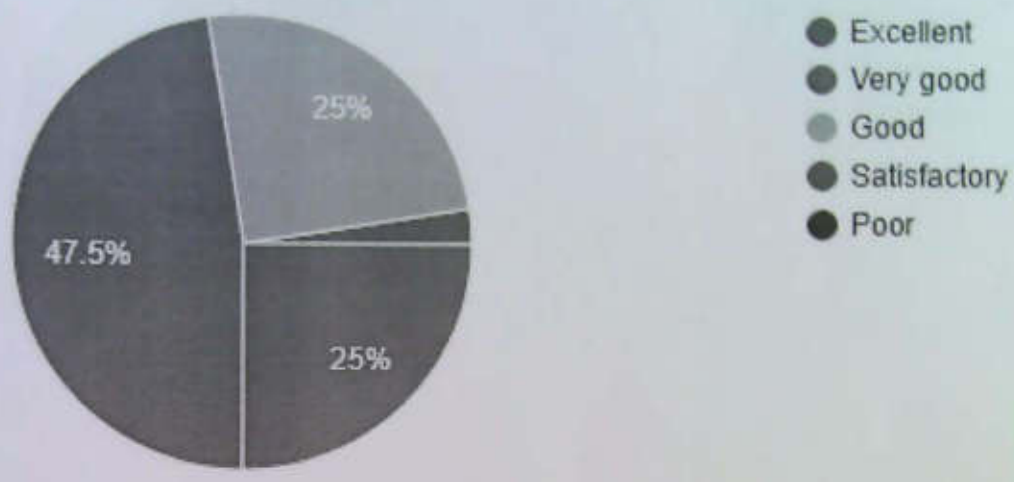
The level of Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of

mathematics, natural sciences, and engineering sciences:

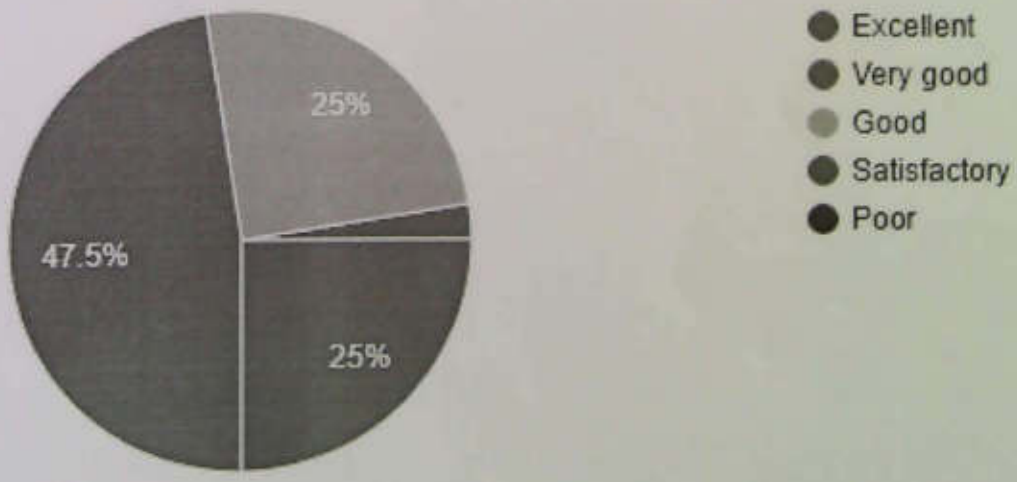
The level of knowledge gained from this training program to create, select and apply modern engineering and IT tools, including forecasting and modeling, technologies and resources suitable for complex engineering operations by understanding the constraints:



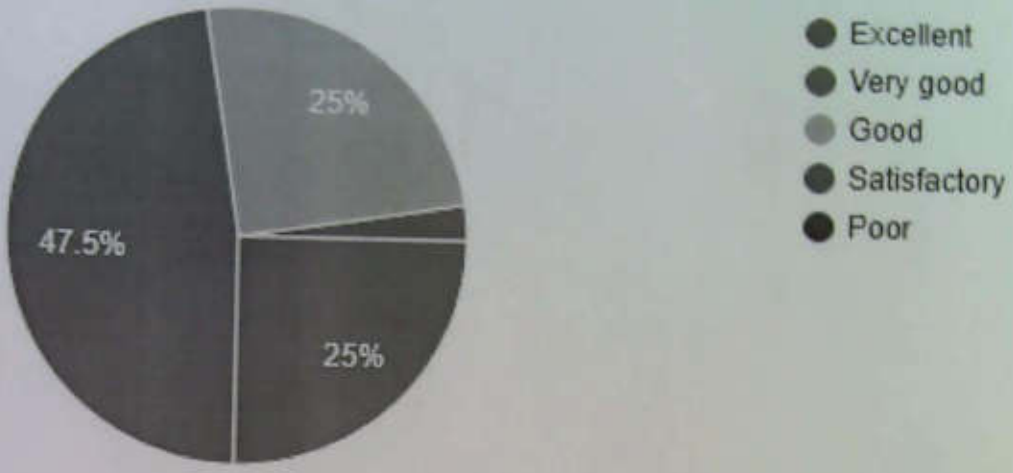
The Training Program helps to understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.



The Training Program helps to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.



The Training Program helps to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.



Level of demonstrating knowledge and understanding of Engineering and management principles, as a member and apply them in own work, Leader in a team, managing projects and in multidisciplinary environments:

Chapter 7

Attainment

7.1 PO Attainment

PO ATTAINMENT

Batch : 2019-2023 CSE A
Year of study: 2021-2022
Name of the Subject with code: ADCS701-BLOCKCHAIN TECHNOLOGY
Name of the Staff: RIJIN IK

CO	LEVEL	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	3	3	-	-	-	-	-
CO 2	3	3	3	-	-	3	-
CO 3	3	3	3	-	-	3	-
CO 4	3	3	3	-	-	3	-

PO	PO1	PO2	PO3	PO4	PO5	PO6
ATTAINED	3	3	-	-	3	-

PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
-	-	-	-	-	-	-	-
-	-	3	-	3	-	-	-
-	-	3	-	3	-	-	-
-	-	3	-	3	-	-	-

PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
-	-	3	-	3	-	-	-

7.2 CO Attainment

CO ATTAINMENT

Course Outcome	Project	Direct Attainment	Indirect Attainment (Course End Survey)	CO Attainment
CO1	3	3	3	**3**
CO2	3	3	3	**3**
CO3	3	3	3	**3**
CO4	3	3	3	**3**

ADCS701-BLOCKCHAIN TECHNOLOGY

Evaluation Rubrics

Project Design : 20 Marks

No	Parameters	Mark	Poor	Fair	Very Good	Outstanding
1	Provides a thorough and well-organized discussion of the history, types, and applications of blockchain technology [CO 1]	5	The discussion is incomplete and disorganized, and key concepts are missing or inaccurate. The history, types, and applications of blockchain technology are not well-explained or connected, and the discussion lacks coherence. (0 – 1 Marks)	The discussion covers the history, types, and applications of blockchain technology, but lacks depth or organization. Some important concepts may be unclear or inaccurate, and the discussion may not flow logically.(2 – 3 Marks)	The discussion provides a thorough and well-organized overview of the history, types, and applications of blockchain technology. Concepts are accurate and clearly explained, and the discussion flows logically and coherently(4 Marks)	The discussion is exceptional, demonstrating mastery of the topic. The content is sophisticated, nuanced, and presented in a compelling manner, with detailed examples and insightful analysis. The history, types, and applications of blockchain technology are thoroughly explored and well-integrated.(5 Marks)
2	Provides a clear and accurate description of cryptography and consensus algorithms [CO 2]	5	The description is inaccurate or unclear, contains significant errors or omissions, and/or does not provide a basic understanding of cryptography and consensus algorithms.(0 – 1	The description provides some accurate information but also includes some inaccuracies or inconsistencies, or may be too general or incomplete to fully understand cryptography and consensus algorithms.(2	The description is mostly accurate and provides a clear and thorough explanation of cryptography and consensus algorithms, demonstrating a good	The description is highly accurate, clear, and comprehensive, providing an in-depth and sophisticated understanding of cryptography and consensus algorithms, and demonstrating a deep expertise in the subject matter.(5

			Marks)	– 3 Marks)	understanding of the concepts and their applications.(4 Marks)	Marks)
3	Provides a clear and accurate description of how blockchain systems, such as Bitcoin and Ethereum, work [CO 3]	5	The description provided is vague, incomplete, or inaccurate. The reader would not gain a clear understanding of how blockchain systems work from reading this description.(0 – 1 Marks)	The description provided is somewhat clear and accurate, but it lacks detail or is overly simplified. The reader would gain a basic understanding of how blockchain systems work, but may still have some questions or misunderstandings.(2 – 3 Marks)	The description provided is clear and accurate, and includes enough detail to give the reader a comprehensive understanding of how blockchain systems work. The reader would feel confident in their understanding of this topic after reading this description.(4 Marks)	The description provided is not only clear and accurate, but also goes above and beyond by providing additional insights, examples, or context that enhance the reader's understanding. The reader would feel not only confident but also engaged and interested in the topic after reading this description.(5 Marks)
4	Successfully designs and builds a smart contract or distributed application using a blockchain platform, such as Ethereum [CO 4]	5	The individual has not demonstrated the ability to design or build a smart contract or distributed application using a blockchain platform such as Ethereum.(0 – 1 Marks)	The individual has some basic knowledge of blockchain technology and has attempted to design and build a smart contract or distributed application using a blockchain platform such as Ethereum. However, the outcome of the project is not very impressive, with several errors and bugs, and the project may not function as intended.(2	The individual has a good understanding of blockchain technology and has successfully designed and built a smart contract or distributed application using a blockchain platform such as Ethereum. The project works as	The individual has demonstrated exceptional knowledge and expertise in blockchain technology and has designed and built a highly complex smart contract or distributed application using a blockchain platform such as Ethereum. The project functions flawlessly, with no errors or bugs, and

				– 3 Marks)	intended, with few errors or bugs, and the code is well-organized and easy to read.(4 Marks)	the code is extremely well-organized and easy to understand. The individual has also implemented innovative and creative solutions to challenges encountered during the project.(5 Marks)

Implementation : 20 Marks

No	Parameters	Mark	Poor	Fair	Very Good	Outstanding
1	Demonstrates proficiency in using tools and programming languages, such as Solidity and Truffle, to develop the smart contract or distributed application [CO4]	10	The individual is unable to demonstrate any proficiency in using Solidity and Truffle to develop a smart contract or distributed application. They may lack basic understanding of the tools and programming languages, and may not be able to execute even simple tasks without assistance.(0 – 1 Marks)	The individual has some familiarity with Solidity and Truffle, but their proficiency is limited. They may be able to perform basic tasks and use basic functions, but may struggle with more complex programming concepts or features. They may require significant assistance or guidance from more experienced developers.(2 – 3 Marks)	The individual is proficient in using Solidity and Truffle to develop smart contracts or distributed applications. They have a strong understanding of the programming languages and tools, and can create complex functions and execute more advanced tasks with ease. They are capable of working independently and require minimal guidance or assistance.(4 Marks)	The individual has exceptional proficiency in using Solidity and Truffle to develop smart contracts or distributed applications. They have a deep understanding of the programming languages and tools, and can create highly complex functions and execute sophisticated tasks with ease. They are capable of working independently and have the ability to innovate and develop new solutions beyond what is commonly practiced.(5 Marks)
2	Successfully deploys the smart contract or distributed application on a blockchain network, such as the Ethereum blockchain [CO 4]	10	The individual has not successfully deployed a smart contract or distributed application on a blockchain network, and does not demonstrate an understanding of the process or technical	The individual has attempted to deploy a smart contract or distributed application on a blockchain network, but encountered technical difficulties or errors. They may have a	The individual has successfully deployed a smart contract or distributed application on a blockchain network, such as the Ethereum	The individual has not only successfully deployed a smart contract or distributed application on a blockchain network, but has

			requirements.(0 – 3 Marks)	basic understanding of the process, but require additional support and guidance to successfully deploy the contract or application.(4 – 6 Marks)	blockchain. They have demonstrated a strong understanding of the technical requirements and have executed the deployment process with few errors or issues.(7 - 9 Marks)	also demonstrated an exceptional leve of expertise and proficiency in the process. They have developed innovative solution to challenges and have a deep understanding of the technical requirements and implications of thei deployment.(10 Marks)

Report : 10 Marks

No	Parameters	Mark	Poor	Fair	Very Good	Outstanding
1	The report should include an introduction, background, project objective [CO1]	5	The report does not include an introduction, background, or project objective, or they are so poorly developed that they do not provide the reader with a clear understanding of the report's purpose and scope.(0 – 1 Marks)	The report includes an introduction, background, and project objective, but they are incomplete or lack clarity, making it difficult for the reader to understand the context and significance of the report.(2 – 3 Marks)	The report includes a clear and concise introduction that provides an overview of the report's purpose and scope. The background provides relevant information that helps the reader understand the context of the project, and the project objective is well-defined and aligned with the report's overall purpose.(4 Marks)	The report includes an engaging introduction that captures the reader's attention and provides a compelling overview of the report's purpose and scope. The background is comprehensive, providing the reader with all the necessary information to fully understand the project, and the project objective is clearly defined and aligned with the report's purpose.(5 Marks)
	The report should include project design and implementation, results and analysis, conclusion and future work, and references.[CO 4]	5	The report is missing one or more of the required sections (project design and implementation, results and analysis, conclusion and future work, and references) or they are incomplete and lack detail. The report may contain significant errors or inconsistencies, and the writing style may be	The writing style may be inconsistent or difficult to follow, and there may be some errors or inconsistencies in the content. The report may provide a basic overview of the project and its results, but lacks	The report includes all required sections and they are complete, detailed, and well-written. The report provides a clear and comprehensive overview of the project design and implementation,	The report exceeds expectations in all aspects. It includes all required sections and they are exceptionally well-written, detailed, and insightful. The report provides a comprehensive and thorough overview of the project and

			difficult to follow.(0 – 1 Marks)	depth or analysis.(2 – 3 Marks)	results and analysis, conclusion and future work, and references. The analysis is thoughtful and insightful, and the writing style is clear and engaging.(4 Marks)	its results, and the analysis is sophisticated and nuanced. The writing style is engaging, persuasive, and demonstrates a mastery of the subject matter.(5 Marks)

Rjm. (R

BLOCKCHAIN PROJECT REPORT

DApp for managing ToDo

Submitted By:

Sharon Rose Babu
Snigdha Sathyanathan
Albin Thomas
Joshua Mathew
Antony Thomas
Sangeeth K
Sidharthan AK
Akash Ajith

Introduction

A blockchain dApp (decentralized application) is a type of software application that operates on a blockchain network. A blockchain is a distributed digital ledger that records transactions across a network of computers. The transactions are secured using cryptography and are stored in a tamper-proof and immutable manner.

Dapps are decentralized in the sense that they operate on a blockchain network, which is a decentralized system. This means that there is no central authority that controls the network or the dapp. Instead, the network is maintained and secured by a group of users who participate in the network through a process called consensus.

Dapps can be used for a variety of purposes, such as creating digital currencies, managing supply chains, and facilitating peer-to-peer transactions. They offer several advantages over traditional centralized applications, including increased security, transparency, and resilience.

In a blockchain dapp, the logic and data are stored on the blockchain network, rather than on a central server. This means that the dapp can operate without the need for a centralized intermediary, such as a bank or a government agency. The users of the dapp can interact with each other directly, without the need for a trusted third party.

The purpose of a DApp is to provide a decentralized, transparent, and secure way for users to interact with the application, without the need for a central authority or intermediary.

The main advantages of DApps are:

1. Decentralization: DApps are designed to be decentralized, which means they run on a network of computers rather than a single server. This makes them resistant to censorship and tampering.
2. Transparency: The data and transactions on a DApp are transparent and publicly visible, which creates a high degree of trust between users.
3. Security: DApps are typically built on blockchain technology, which provides a high degree of security against fraud, hacking, and other malicious activities.
4. Openness: DApps are open-source software, which means that anyone can review the code and make improvements or modifications to the application.

The purpose of a DApp can vary depending on the specific application, but some common use cases include:

1. Decentralized finance (DeFi): DApps can be used to create decentralized financial applications, such as lending and borrowing platforms, decentralized exchanges, and stablecoins.

2. Supply chain management: DApps can be used to create a transparent and secure supply chain management system, where all parties involved in the supply chain can track the movement of goods and verify their authenticity.
3. Social media: DApps can be used to create decentralized social media platforms, where users have control over their data and content.
4. Gaming: DApps can be used to create decentralized gaming platforms, where players can trade in-game assets and participate in tournaments without the need for a central authority.

Blockchain technology is a revolutionary technology that has the potential to transform various industries by creating secure, decentralized, and transparent systems. Its key features of decentralization, immutability, and security make it a popular choice for various applications, and its adoption is expected to grow rapidly in the coming years.

Blockchain Technology

Blockchain technology is a distributed digital ledger system that is used to record transactions and store data in a secure and decentralized manner. It was first introduced in 2008 by a person or group of people using the pseudonym "Satoshi Nakamoto" as the underlying technology for the cryptocurrency Bitcoin. Since then, blockchain technology has been adopted by various industries and has become an integral part of many innovative projects.

The concept of blockchain revolves around the idea of creating a secure and tamper-proof digital ledger that can be accessed and verified by multiple parties. The ledger is distributed across a network of computers, which are referred to as nodes. Each node in the network has a copy of the ledger, and each transaction that occurs on the network is recorded on each node's copy of the ledger.

In a blockchain, transactions are recorded in blocks, and each block is linked to the previous block in a chronological sequence, forming a chain of blocks. This chain of blocks is known as the blockchain. Once a block is added to the blockchain, it cannot be altered or deleted, making the blockchain a permanent and immutable record of all transactions.

Blockchain technology uses cryptographic algorithms to ensure the integrity and security of the data stored on the network. Each transaction is verified by multiple nodes on the network, and once a consensus is reached, the transaction is added to the blockchain. This process is known as "mining" and is typically carried out by specialized nodes called "miners" who are incentivized with cryptocurrency rewards for their efforts.

The decentralization of blockchain technology ensures that there is no single point of failure, and the network is not controlled by any central authority. This makes the blockchain highly resistant to hacking and cyber-attacks, as it would require an attacker to take control of a majority of the nodes on the network to alter the blockchain's records. Additionally, the use of

encryption ensures that the data on the blockchain is highly secure and cannot be accessed by unauthorized parties.

One of the key benefits of blockchain technology is that it can be used to create trustless systems, where parties can transact with each other without the need for intermediaries. This has led to the development of various decentralized applications (dApps) that operate on blockchain networks, such as decentralized finance (DeFi) platforms, supply chain management systems, and voting systems.

Blockchain technology can provide several benefits for task management, including:

1. Decentralization: One of the main benefits of blockchain technology for task management is its decentralized nature. Tasks and assignments can be recorded on a blockchain network and shared with all authorized parties in a secure and transparent manner. This ensures that all stakeholders have access to the same information and can track the progress of tasks in real-time, reducing the need for intermediaries.
2. Transparency: The transparency of blockchain technology ensures that all task-related data is publicly accessible and verifiable, providing a clear audit trail of task completion and progress. This allows team members to quickly identify issues and resolve them before they become major problems.
3. Immutability: The immutability of the blockchain ensures that once a task is recorded on the network, it cannot be altered or deleted, providing a permanent record of all completed tasks. This reduces the risk of fraudulent activity and ensures that all stakeholders can trust the accuracy of the task-related data.
4. Smart Contracts: Smart contracts are self-executing contracts that are encoded on a blockchain network and automatically execute when certain conditions are met. This technology can be used to automate task management processes, reducing the need for human intervention and ensuring that tasks are completed on time and within budget.
5. Efficiency: Blockchain technology can streamline the task management process by automating many of the manual processes involved in task management, reducing the time and resources required to complete tasks. This can lead to increased efficiency and productivity, allowing team members to focus on more value-added tasks.
6. Security: The security features of blockchain technology, such as encryption and consensus algorithms, ensure that task-related data is secure and protected from unauthorized access or modification. This reduces the risk of data breaches and cyber-attacks, ensuring that all stakeholders can trust the security of the task-related data.

Requirements

To use a DApp, you typically need three things:

1. A device with internet access: You will need a computer or mobile device with internet access to connect to the decentralized network where the DApp is running.
2. A compatible web browser or wallet: To interact with a DApp, you will need a compatible web browser or wallet that supports the DApp's protocol. Some DApps require specific wallets or browser extensions to interact with them, while others can be accessed through a standard web browser.
3. Cryptocurrency or tokens: Many DApps require users to hold a specific cryptocurrency or token in order to use the application. For example, a DeFi DApp may require users to hold Ether (ETH) or a stablecoin such as USDT or DAI in order to participate in lending or borrowing activities. Users may also need to pay transaction fees in the cryptocurrency or token in order to interact with the DApp.

It's important to note that using a DApp can sometimes be more complex than using a traditional web application, as users need to take extra steps to ensure the security of their funds and data.

Description of account or software

To use a decentralized application (dapp), you typically need a few things:

1. A compatible web3-enabled cryptocurrency wallet: A web3-enabled wallet allows you to interact with dapps on the blockchain. Examples of web3-enabled wallets include MetaMask, Trust Wallet, and Coinbase Wallet. These wallets allow you to securely store your cryptocurrency and interact with dapps using your private key.
2. Sufficient cryptocurrency funds: Since dapps operate on a blockchain network, you typically need to have sufficient cryptocurrency funds to pay for transaction fees and interact with the dapp. The specific cryptocurrency required depends on the dapp and the blockchain network it operates on.
3. Access to the dapp: You can access a dapp by typing its web address into your browser or by finding it on a decentralized app store like State of the Dapps or Dapp.com. Once you have accessed the dapp, you can usually connect your web3-enabled wallet and start interacting with it.
4. Some dapps may require additional software or plugins: Depending on the dapp, you may need to download additional software or plugins to use it. For example, some dapps may require you to download a specific browser extension or plugin to enable certain functionalities.

It's important to note that the specific requirements for using a dapp can vary depending on the dapp and the blockchain network it operates on. Therefore, it's always a good idea to research the specific requirements for each dapp before attempting to use it.

Features

Decentralized applications (dApps) are software applications that run on a decentralized network, typically a blockchain. They offer several key features that distinguish them from traditional centralized applications. Some of the key features that dApps offer include:

1. Decentralization: dApps are built on decentralized networks, which means that they are not controlled by a single entity or organization. This makes them more resistant to censorship, hacking, and other forms of interference. Instead, dApps are typically run by a network of nodes that collectively maintain the integrity and security of the application.
2. Transparency: Because dApps are built on a decentralized network, all transactions and activities on the network are publicly visible and transparent. This ensures that all stakeholders can see and verify the actions of other participants in the network, making it easier to build trust and accountability.
3. Security: dApps are typically secured by cryptography and consensus mechanisms, which make them highly resistant to fraud, hacking, and other forms of malicious activity. Because the network is decentralized and distributed across many nodes, it is much harder for attackers to compromise the network and alter data or steal assets.
4. Open Source: Many dApps are open source, which means that the source code is freely available for anyone to view, modify, and distribute. This allows for greater collaboration and innovation, as developers can build on top of existing dApps and contribute to their development.
5. Smart Contracts: dApps often make use of smart contracts, which are self-executing contracts that are stored on the blockchain. Smart contracts allow for the automation of certain functions and can be used to enforce rules and regulations within the dApp. This can help to reduce the need for intermediaries and increase efficiency and transparency.
6. Tokenization: Many dApps use their own native cryptocurrency or token to facilitate transactions and incentivize users. These tokens can be traded on exchanges and can be used to access certain features or functions within the dApp. Tokenization can help to align incentives and encourage user participation.

dApps offer a range of features that make them highly attractive for developers and users alike. Their decentralized nature, transparency, security, and use of smart contracts and tokens make them well-suited for a wide range of applications, from finance and logistics to gaming and social media. As the technology continues to evolve, we can expect to see even more innovative use cases for dApps in the future.

User Interface

The user interface (UI) of a decentralized application (dApp) can vary widely depending on the specific application and its intended use case. However, there are some common elements and design principles that are often used in dApp user interfaces.

Firstly, dApps typically have a simple and intuitive interface that is designed to be easy to use and navigate. This is important because many users may not be familiar with blockchain technology or cryptocurrency, and may require some guidance to understand how the dApp works.

Secondly, dApps often feature a clean and minimalistic design, with a focus on functionality and usability over aesthetics. This is because many dApps are focused on specific use cases such as finance, supply chain management, or social media, and users are primarily interested in the functionality rather than the visual design.

Thirdly, dApps often make use of standard design elements and user interface components such as buttons, forms, and menus. This makes it easier for users to understand how to interact with the dApp and reduces the learning curve.

Fourthly, dApps often make use of pop-up windows and modals to display information and prompt users for input. This can help to keep the UI clean and uncluttered, while still providing users with the information they need to make informed decisions.

Finally, dApps often make use of graphical elements such as charts and graphs to help users visualize data and make sense of complex information. This can be particularly important in financial applications, where users may need to track their investments or monitor market trends.

Here are some general steps that users can follow to use a dApp:

1. Choose a dApp: The first step is to choose a dApp that meets your needs. There are many different types of dApps available, from finance and gaming to social media and supply chain management. You can search for dApps on blockchain app stores or directories, or through online communities and forums.
2. Access the dApp: Once you have chosen a dApp, you will need to access it through a compatible web browser or mobile app. Many dApps require a compatible wallet or browser extension to access, so make sure you have the necessary software installed.
3. Create an account: Some dApps may require you to create an account or connect your existing wallet to access certain features or functions. You will typically need to provide some personal information and create a password or passphrase to secure your account.
4. Explore the interface: Once you have accessed the dApp and created an account, you can begin to explore the user interface. Look for menus, buttons, and other interface elements that allow you to interact with the dApp and perform specific functions.
5. Follow on-screen instructions: Many dApps have on-screen instructions or tooltips that provide guidance on how to use the application. Pay close attention to these instructions, as they can help you navigate the dApp and avoid common mistakes.
6. Perform transactions: Depending on the dApp, you may need to perform transactions using cryptocurrency or tokens to access certain features or functions. Make sure you

have the necessary funds in your wallet and follow the on-screen instructions to complete the transaction.

7. Monitor your account: Finally, make sure you monitor your account and keep track of your transactions and activities. This can help you identify any issues or errors and ensure that your account is secure.

Using a dApp is similar to using any other type of software application, but with some additional steps and considerations related to blockchain technology and cryptocurrency.

Working

Decentralized applications (dapps) are designed to run on a blockchain network, which is a decentralized and distributed database that is maintained by a network of nodes. The blockchain is secured through cryptographic protocols, which ensures that the data stored on the blockchain is immutable and transparent.

Dapps are typically developed using smart contract technology, which is a self-executing code that is stored on the blockchain. Smart contracts enable dapps to execute specific actions automatically, without the need for intermediaries or third parties.

When a user interacts with a dapp, the interaction is typically processed through the smart contract. For example, if a user wants to make a transaction or perform a specific action on the dapp, the request is processed by the smart contract code.

The smart contract code then verifies the request, checks that the user has sufficient funds or permissions, and executes the requested action. Once the action is executed, the results are stored on the blockchain and can be viewed by anyone on the network.

Since dapps are decentralized, there is no central authority controlling the application. This means that users have greater control over their data and assets, and can interact with the dapp without relying on intermediaries or third parties. The transparency and immutability of the blockchain also ensure that the data stored on the dapp is secure and cannot be tampered with.

The decentralized nature of dapps, combined with smart contract technology, enables them to provide secure, transparent, and efficient applications that can operate without intermediaries or central authorities.

The process and algorithms included in the working of a dapp can vary depending on the specific application and the blockchain network it operates on. However, here is a general overview of the process and algorithms involved in the working of a typical dapp:

1. Smart contract development: Dapps are typically built using smart contract technology, which is a self-executing code that is stored on the blockchain. Smart contracts can be developed using programming languages such as Solidity, and they enable the dapp to execute specific actions automatically.

2. Deployment of smart contracts: Once the smart contract code is developed, it needs to be deployed on the blockchain network. This involves creating a transaction on the network that contains the smart contract code, and then waiting for the transaction to be processed and added to the blockchain.
3. User interaction: Once the smart contract code is deployed, users can interact with the dapp by sending transactions to the smart contract. These transactions can include requests to perform specific actions, such as transferring cryptocurrency or updating data on the dapp.
4. Verification and execution of smart contract code: When a user sends a transaction to the smart contract, the code is executed automatically. The smart contract code verifies the transaction, checks that the user has sufficient funds or permissions, and then executes the requested action. If the action is successful, the smart contract code updates the state of the dapp on the blockchain.
5. Mining and consensus: Transactions and smart contract code updates are added to the blockchain through a process called mining. Miners use their computing power to solve complex mathematical algorithms and validate transactions. Once a block is mined, it is added to the blockchain, and all nodes on the network update their copies of the blockchain to reflect the latest state of the dapp.
6. User interface: To enable users to interact with the dapp, a user interface is typically created. This can include a website or mobile app that communicates with the smart contract code on the blockchain network.

Potential Use Cases

An example of how a dapp can be used in the context of a peer-to-peer (P2P) lending platform:

Let's say you want to borrow money from a P2P lending platform. Traditionally, you would need to go through a centralized intermediary such as a bank or a credit union, which would evaluate your creditworthiness, set interest rates, and handle the loan disbursement process.

With a dapp-based P2P lending platform, the process is different. You can access the platform through a web interface or a mobile app, and interact directly with the smart contract code on the blockchain network. Here's how the process might work:

1. You create an account on the P2P lending platform, using a web3-enabled cryptocurrency wallet to authenticate your identity and store your cryptocurrency funds.
2. You submit a loan application, including information such as the amount you want to borrow, the interest rate you're willing to pay, and the duration of the loan.
3. The smart contract code on the blockchain network evaluates your loan application, checks your creditworthiness based on your transaction history on the blockchain, and verifies that you have sufficient funds to repay the loan.

4. If your loan application is approved, the smart contract code automatically creates a loan agreement between you and the lender, with the terms and conditions of the loan set by the smart contract code.
5. Once the loan agreement is created, the lender sends the loan funds to the smart contract code on the blockchain network. The smart contract code then holds the funds in escrow until the loan is repaid.
6. You receive the loan funds, and can use them as you wish. You make monthly loan payments to the smart contract code on the blockchain network, which distributes the payments to the lender and deducts any interest and fees.
7. Once the loan is fully repaid, the smart contract code releases the loan funds from escrow and sends them back to the lender.

A dapp-based P2P lending platform enables borrowers to access loans without relying on centralized intermediaries, and provides lenders with a transparent and secure way to earn interest on their funds. This is just one example of how a dapp can be used, and there are many other potential use cases for dapps in areas such as finance, healthcare, supply chain management, and more.

Decentralized applications (dapps) have the potential to solve certain problems by leveraging the benefits of blockchain technology, such as decentralization, transparency, and security. Here are some examples of how dapps can address specific problems:

1. Lack of trust: Dapps can help address the problem of lack of trust between parties by leveraging the transparent and immutable nature of the blockchain. For example, a dapp for supply chain management could allow participants to track the entire lifecycle of a product on the blockchain, from raw materials to the final product, ensuring transparency and accountability.
2. Centralization: Dapps can address the problem of centralization by enabling peer-to-peer interactions without the need for intermediaries. For example, a dapp-based peer-to-peer lending platform could eliminate the need for traditional banks, enabling borrowers and lenders to interact directly on the blockchain network.
3. Security: Dapps can help address security concerns by leveraging the decentralized and secure nature of the blockchain. For example, a dapp for digital identity management could use blockchain technology to securely store and manage user identities, eliminating the risk of identity theft and data breaches.
4. Interoperability: Dapps can help address the problem of interoperability by enabling seamless interactions between different blockchain networks. For example, a dapp for cross-chain asset transfers could enable users to transfer cryptocurrency between different blockchain networks, without the need for intermediaries.
5. Data privacy: Dapps can help address the problem of data privacy by enabling users to control their own data. For example, a dapp for healthcare data management could allow patients to securely store and manage their own health data on the blockchain, while controlling who has access to it.

Implementation: ToDo App

Source Code:

```
pragma solidity ^0.5.0;

contract TodoList{
	uint public taskCount=0;

	struct Task{
		uint id;
		string content;
		bool completed;
	}

	mapping(uint => Task) public tasks;

	constructor() public {

		createTask("TASK 1");
	}


	function createTask(string memory _content) public{
		taskCount++;
		tasks[taskCount]= Task(taskCount, _content, false);
	}


	function toggleCompleted(uint _id) public {
		Task memory _task = tasks[_id];
		_task.completed = !_task.completed;
		tasks[_id] = _task;

	 }

}
```

Conclusion

In conclusion, decentralized applications (dapps) are a promising new technology that have the potential to transform many different industries by leveraging the benefits of blockchain technology. Dapps enable decentralized, transparent, and secure interactions between parties, and can address a range of problems such as lack of trust, centralization, security, interoperability, and data privacy.

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