TATA CONSULTANCY SERVICES

INFRAMIND 3

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BLOCK CHAIN TRANSACTION

Introduction/Understanding the Problem statement:

A blockchain is, an immutable time-stamped series record of data that is distributed and managed by cluster of computers.

A block in a blockchain is a collection of data. The data is added to the block in blockchain, by connecting it with other blocks in chronological others creating a chain of blocks linked together. The first block in the Blockchain is called Genesis Block.

Blockchain is a distributed ledger, which simply means that a ledger is spread across the network among all peers in the network, and each peer holds a copy of the complete ledger.

Initially, Blockchain used for bitcoin and other cryptocurrencies blockchain has now found use cases in several industries including finance, real estate, bank, health, etc.

Some key attributes of Blockchain:

- Peer-To-Peer
- Distributed
- Cryptographically Secured
- Add-Only
- Consensus

Pillars of blockchain:

- Decentralization
- Transparency
- Immutability

DETAILS OF TECHNOLOGY USED:

- **Metamask:**

  METAMASK is a bridge that allows you to visit the distributed web of tomorrow in your browser today. It is an extension for accessing Ethereum enabled distributed applications. The extension injects the Ethereum web3 API into every website's javascript context, so that dapps can read from blockchain.
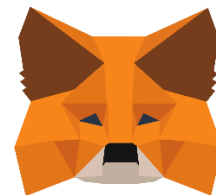
- **Remix Solidity:**

  Remix-Ethereum IDE is a powerful, open source tool that helps you write solidity contracts straight from the browser. Remix also supports testing, debugging, and deployment of smart contract and much more.

- **Etherscan:**

  Etherscan is basically a search engine that allows user to lookup, confirm and validate transactions that have taken place on Ethereum blockchain.

REQUIRED SOFTWARE/HARDWARE:

- **Software**
  - Windows 10
  - Web browsers
  - Cloud software
- **Hardware**
  - Intel i5 7th generation
  - 8gb ram
  - 1TB hard disk

ACHIEVED COST SAVING:

- **Highly secured:**

  Blockchain technology uses a digital signature feature to conduct fraud-free transaction making it impossible to corrupt or change the data of an individual by the other users without a specific digital signature.

- **Decentralized system:**

  Actually, blockchain runs in peer to peer process so there is no central server in this, conventionally you need the approval of regulatory authorities like a government or bank for transactions. However, with blockchain, Transactions are done with mutual consensus of users resulting in smoother, safer and fast transactions.
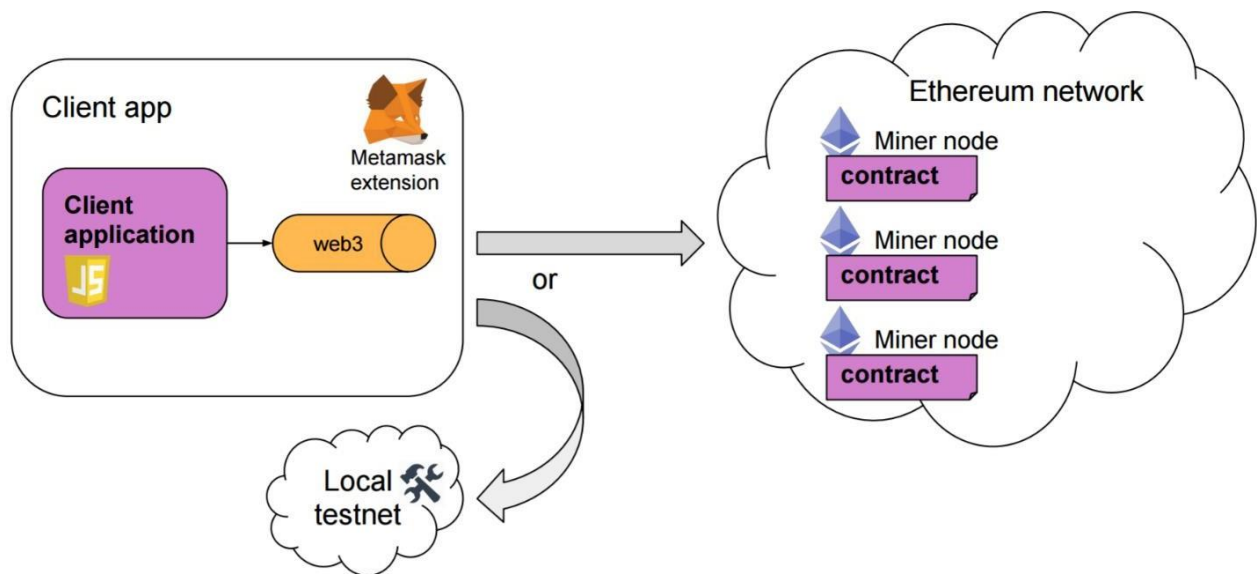
- **Automation capability:**

  Blockchain technology is programmable and can generate systematic actions, events and payments automatically when the criteria of the trigger are met.

ARCHITECTURE:
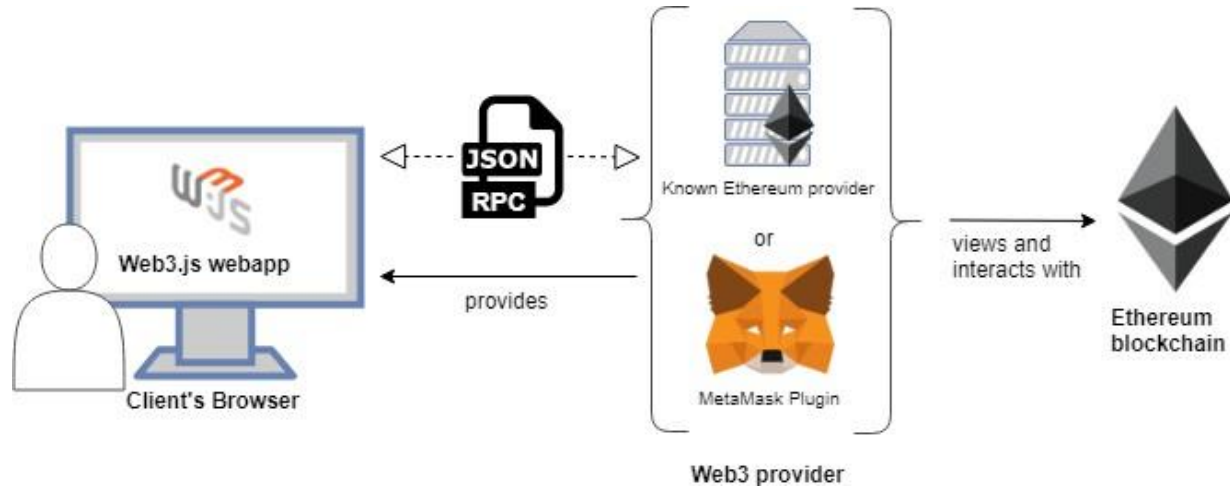
TRANSACTION USING META MASK TEST NETWORK:

Meta Mask is a simple platform to use the Ethereum Blockchain, Actually Meta Mask consist of three test Networks and each behaves similarly to the production blockchain. (Test networks is nothing but we can do transaction with Ethers not with real money)

Developers may have a personal preference or favorite testnet, and projects typically develop on only one of them.

Types of Test Network:

- **Ropsten**
- **Kovan**
- **Rinkeby**

SOLUTION BRIEF DESCRIPTION:

Money Transfer and Its Drawbacks:

Remittance is fund -transfer transaction where in funds are moved from one account to another account within the same or any other financial institution. In a cross-border payment, Swift handles only the movement of messages along the payment chain. The correspondent banks to the actual debits and credits across accounts based on the message and help pass on the value to the final beneficiary.

For example, bank A is sending a euro amount to a euro account in bank D in Germany. The workflow is given below:

- An MT103 (a SWIFT message format) in $US is sent to bank A in the US.
- Bank A sends the payment request to its correspondent bank, bank B via Fedwire and accompanies a debit / credit instruction for onward transmission.
- Bank B does the adjustments and sends a message to its correspondent bank, bank C in Brussels via the SWIFT network.
- Bank C transmits the value via Single Euro Payments Area (SEPA) to bank D in Germany.
- Bank D credits the supplier account in EUR.

Figure 1: Payment flow chart - Bank A sending euro amount to a euro account in bank D in Germany
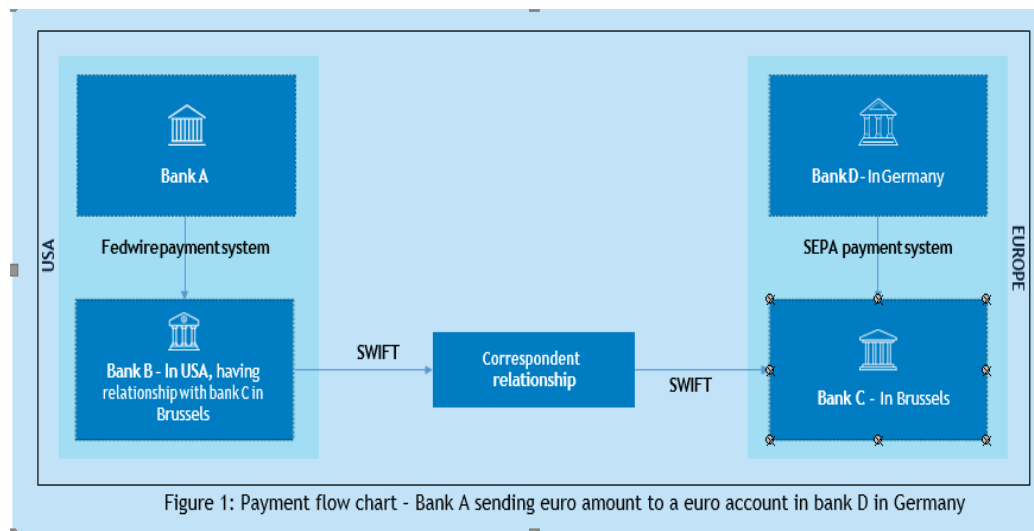
As shown in the payment flow chart, the banks charge fees for processing of each transaction, thus increasing the costs involved for all parties concerned. SWIFT charges for transmitting the messages and thus adds to the cost. Since the ledgers are local to the banks, the SWIFT messages ensure the debit entry of one bank's ledger is communicated to another bank so as to pass / post the corresponding credit entry in its ledger. With the increase in the number of payment messages in the chain, fees on SWIFT messages also increase. Presence of a trusted third party with powers to overwrite and overturn ledger activities needed to have a unified view.

SWIFT charges the bank for processing the payment orders irrespective of whether the bank is at both the receiving and sending end of the instruction. Since the payment moves across Fedwire to SWIFT and then through SEPA, the messages involved are varied and different.

SOLUTIONS FOR MONEY TRANSFER USING BLOCKCHAIN IN DETAIL:

Blockchain is a universal ledger present in a distributed network which is accessible to everybody in the network. Thus, each node in the network will have a complete copy of the entire database or the ledger and any modifications to the same will have to be duly verified by other nodes / parties to validate on the modification done. Thus, it requires a consensus of nodes to agree upon the state of the ledger for it to be valid. This would mean that direct transfers can occur instantly now and without fear of manipulation even for cross-border payments, because there are no intermediaries or correspondent banks involved. The underlying concept of distributed ledger makes it possible for the banks to have a bilateral, visible, and immutable transfer of value, adjudicated by the settlement agency.
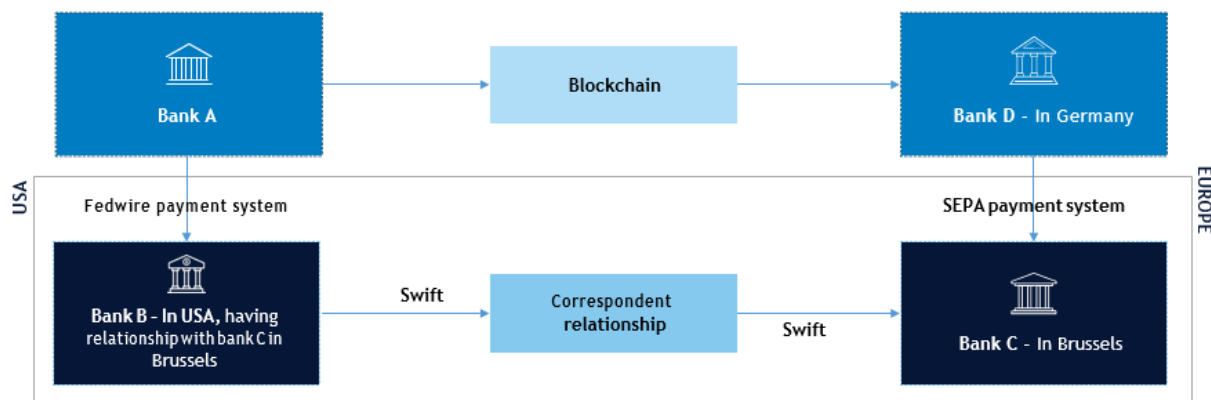

Figure 2: Money transfer from bank A to bank D through blockchain eliminating the 3rd party as highlighted

As depicted in Figure 2, blockchain brings in the following benefits:

- It leads to the exclusion of any middlemen, central agencies, or correspondents from the payment processing. Transaction is amidst the parties who have entered into a bilateral agreement, thus ensuring trust is in place.
- Reduced cost with minimal charges along the payment chain. In addition, SWIFT charges for the processing of the messages if the messages are routed through it. As of result of such charges, the correspondent banks / central agencies add to the cost of processing the payment, for activities like receiving, collating, and netting payment messages before retransmitting confirmations / denials to the respective banks.
- Reduced turnaround time for settlement as there is no need for central agencies and movement of messages.

- Since the details of the transaction are encrypted and hashed, there is hardly any possibility to modify the data.
- Subject to no messages being transmitted, the challenges around the standardization are minimized too.
- Increased payment transparency with distributed ledger as sender and receiver are the nodes of the network / chain

SCOPE OF AUTOMATION:

Future Technology:

- **Blockchain in Cyber Security:** Though the blockchain is a public ledger, the data is verified and encrypted using innovative cryptography technology. In this manner, the information or data is less likely to be attacked or altered without authorization.
- **Blockchain will remove the requirement of the third party:** With the help of Blockchain technology, basically, it is possible to impact a varied range of processes and techniques. It eliminates the need of trusted third party in the transactions. Well most prominent organizations in the world exist today to function as a trusted third party, for instance, SWIFT, and the Depository Trust Cleaning Company. Corporate chances flourish for companies that can build applied Blockchain technologies aiming for particular transactions, like the mortgage industry. The existing mortgages needed a complicated web of title searches, title insurance, and uncountable minor transaction fees which are required to keep the system running. These systems occur because traditionally, the transfer of land has been a process which requires a significant amount of belief in the old records. The Blockchain technology was going to address all these concerns, and a particular property's ledger consists of a verifiable and validated transactions history, lowering the necessity of institutions to provide risk modification and trust services.
- **Supply chain Management:** With the help of blockchain technology, it is possible to document the transaction in an everlasting distributed record, and supervise the transactions more sturdily and transparently. This also helps to minimize human errors and time delays. It is also used monitor costs, employment, and releases at each point of the supply chain. But this has severe effect for understanding and monitoring the actual ecological impacts of products. Not only this the decentralized ledger can also be utilized to check the legitimacy or fair-trade status of products by following them form their source.
- **The Blockchain in Forecasting:** The blockchain technology is set to alter the complete methodology for research, consulting, analysis and forecasting. The global distributed prediction markets are created with the help of online platforms.
- **Use of Blockchain in the Internet of Things and Networking:** Different companies like Samsung and IBM are utilizing the blockchain technology for a new concept called ADEPT, this will help to create a distributed network of IoT devices. The blockchain technology will remove the requirement for a central location to manage the communication between them; this will function as a public ledger for a massive number

of devices. The devices may communicate with each other to upgrade the software, handle the errors and observe energy practice.

- **Blockchain in cloud storage:** The data on a centralized server is exposed to hacking, loss of data, or human error. With the help of blockchain technology, it is possible to make the cloud storage more protected and robust against hacking.

CONCLUSION:

The application of Blockchain technology is not limited only to the finance industry. It has a fantastic future in different sectors such as supply chain management, digital advertising, forecasting, cyber security, Internet of things, networking, etc. Blockchain technology also has a huge prospective to provide the new openings for occupation in the industry. It also enhances the professional's capability to upgrade themselves. With the help of Blockchain technology, it is possible to transform the whole world into a much smaller place. The transactional activities can be performed much faster and efficiently using Blockchain. Blockchain technology is going to be used in many more sectors in the future such as in government systems as these systems are slow, dense, and likely to corruption. Implementing Blockchain technology in government system can make their operations much more secure and efficient.

REFERENCE:

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