

# PHOTOGROUP: DECENTRALIZED WEB APPLICATION USING ETHEREUM BLOCKCHAIN

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**ABSTRACT-** In today's world social networking platforms such as Instagram, Facebook, Google+ etc, have created the boon in our humanitarian society[1]. Along with these social networking platforms there comes a great responsibility of handling user privacy as well as user data. In most of these websites, data is stored on the centralized system called as the server. [1] The whole system crash down if the server goes down. One of the solutions for this problem is to use a decentralized system. Decentralized applications works on Blockchain. A Blockchain is a group of blocks connected sequentially to each other. The blockchains are designed so that transactions remain immutable i.e. unchanged hence provides security. The data can be distributed and no one can tampered that data. This paper presents a decentralized social media photo sharing web application which is based on blockchain technology where the user would be able to view, like, comment, share photos shared by different users.

**Key Words –Blockchain, data sharing, privacy, access control, dapps, ethereum, smart contracts.**

## 1. INTRODUCTION

Digital world has produced efficiencies, new innovative products, and close customer relationships globally by the effective use of mobile, IoT (Internet of Things), social media, analytics and cloud technology to generate models for better decisions [6]. Social networking platform is based on client server architecture in which different content of the user is stored on centralized system. Whenever any user tries to load his daily news feeds, a request is sent to the server. This request is processed and an appropriate response related to the request is returned to the user. Sending these requests to the server can be considered as a harmful task as these requests may get interrupted by many sources like hackers. Even though storing the data on the servers is beneficial for the company for data analytic, recommendations, and data predictions but there are more chances of data theft, piracy, social abuse etc. Using decentralized application for social networking websites would not only save the storage space required but also would keep users data safe from being attacked from a third party (hackers). Photogroup is a decentralized social media photo sharing web application. Users will be able to share, upvote,

downvote their photographs on this website. Photogroup uses a mechanism which connects users using Peer to peer network like connection called blockchain. By using blockchains like ethereum we will be able to develop a decentralized application which would avoid data theft, privacy, and tampering.

## 2. LITERATURE SURVEY

In “Blockchain Technology Innovations” paper they research about Blockchain. The authors of this paper have identified the Blockchain technology as a catalyst for emerging use cases in the financial and nonfinancial industries such as industrial manufacturing, supply chain, and healthcare[5]. Blockchain can play a pivotal role in transforming the digitization of industries and applications by enabling secure trust frameworks, creating agile value chain production, and tighter integration with technologies[5]. The platforms and components were chosen to ensure a robust framework on the prevention and remediation of cyber-security breaches[5].

In “MeDShare: Trust-less Medical Data Sharing Among Cloud Service Providers Via Blockchain” paper author designed a data sharing model between cloud service providers using the blockchain. The design consists of use of smart contracts and an access control mechanisms to effectively trace the behavior of the data as well as revoke access to violated rules and permissions on data[6]. They analyze the performance of system as well as compare with current cutting edge solutions to data sharing among cloud service provider and it provide a secured blockchain-based data sharing of electronic medical records among untrusted parties [6]. Medical data can be stored securely without any risk.

In “Blockchain based distributed control system for Edge Computing” paper author focused on privacy problem in Edge computing devices such as in IoT applications where every device is connected in network. There is a possibility of data theft. So come up with a system called hierarchical distributed control system model for edge computing. They have investigated the IEC 61499 standard for distributed control systems, and have presented the ongoing research regarding the implementation of function blocks as smart contracts executed by the

blockchain on a supervision level, as well as the integration with the edge nodes that perform the executive level responsible for process control [7]. Blockchains allow us to have a distributed peer-to-peer network where non-trusting members can interact with each other without a trusted intermediary, in a verifiable manner [7].

In “Blockchain Solutions for Big Data Challenges” paper, in this paper presents the novel solutions associated with some of the Big Data areas such as management of private data and digital property resolution can be permitted by the Blockchain technology [8]. It exists on a P2P network where every full node stores a copy of the Blockchain ledger. When a new transaction is created, the sender broadcasts it in the P2P network to all the other nodes. It can play a crucial role in security for user authentication, restricting access based on a user’s need, recording data access histories and proper use of encryption on data. The author has done research on how blockchain can be applied in different application such as in personal data store in healthcare, IoT applications.

In “Blockchain based Approach to Enhance Big Data Authentication in Distributed Environment” paper author have done research in authentication protocols in Big data System such as Apache Hadoop. The mostly Kerberos protocol is used but there are common security problems which are not solved. In this paper, security issues are solved by Blockchain technology. This help to identify authentication requirements to enhance the security of Big data in distributed environments.

### 3. SYSTEM ARCHITECTURE

The centralized application has a single point of failure i.e. if the server is down due to some technical difficulties then the whole system would not be able to deliver services to its clients. The decentralized application works on a block chain.

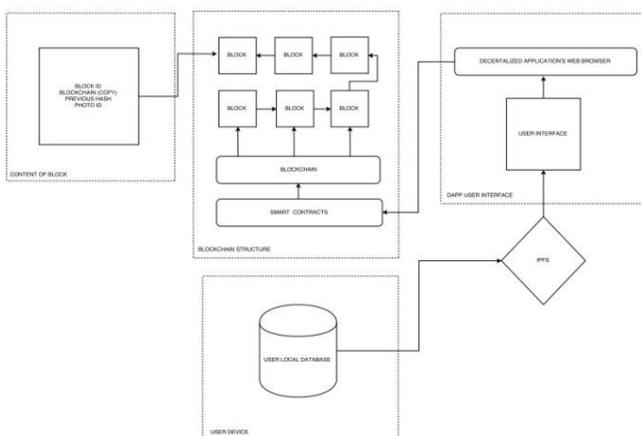


Figure. System-Architecture

System comprises following components:

#### 3.1 Dapps (decentralized applications)

Every client (browser) communication with its own instance of the application. Every client has to download the entire blockchain on their computer/Phone before using application.

#### 3.2 Ethereum:

Ethereum is an open-source, public, blockchain-based distributed computing platform featuring smart contracts (scripting functionality). It provides a decentralized Turing-complete virtual machine, the Ethereum virtual machine (EVM) which can execute scripts using an international network public nodes. Ethereum virtual machine is used to execute the code which is present on blockchain i.e. smart contracts. Ethereum has a javascript library called web3.js which is used for creating the connection to the blockchain.

#### 3.3 Smart Contracts:

Smart contracts are self-executing contracts with terms of the agreement between buyer and seller is directly written into lines of code. The codes and the agreements contain therein exists across a distributed, Decentralized blockchain network. They permit trusted transaction and agreements to be carried out among anonymous parties without the need for a central authority. They render transactions traceable, transparent, and irreversible. In this project, smart contracts play a role of adding the transaction into the blocks of the blockchain as per the smart contract’s rules.

#### 3.4 Blockchain:

A Blockchain is digitized, decentralized, public accounting records (ledger) of all cryptocurrency transaction. Set of blocks connected sequentially to each other in Blockchain. A block is current part of the blockchain which records some or all of the recent transactions. Once completed the block goes into the blockchain as a permanent database. There is a countless number of blocks present in the blockchain which is connected in proper linear, chronological order. Every block contains a hash of the previous block. The blockchain has complete information about different user addresses and their balances right from the beginning block to the most recently completed block. The blockchains are designed so that transactions remain immutable i.e. unchanged. Because of this reason, the data cannot be tampered by any means. In blockchain, data can be distributed but cannot be copied. Back-end structure of blockchain is written in smart contracts. Smart

contracts are used to define how each block in the blockchain should interact with each transaction.

### 3.5 Ngrok:

Ngrok allows us to expose a web server running on the local machine to the internet. It provides a real-time web UI where it introspects all the HTTP traffic running over users tunnel.

## 4. METHODOLOGY

Photogroup uses ethereum as a blockchain platform. Ethereum smart contracts are used as smart contracts in the blockchain. Each block would contain BlockID, a copy of blockchain, Hash value of the previous block, PhotoID of different photos present in each block. Each block represents a user and for any user to enter into the blockchain, User must be the part of the blockchain. Logging into the system would enable the user to become the part of the blockchain. Information of each user and the previous user would be recorded in each block so that blocks would be arranged in sequential order. The Arrangement of the blocks in a sequential order would give the advantage that no block or no user's data would be tampered or hacked by any external sources. Each new user would be added at the end of the blockchain. Blockchain does not allow to add blocks in the middle of the chain. A decentralized user interface will provide a medium for the user to interact with different entities of the application. Decentralized application user interface will be provided using the web browser. Web3 is used for building the user interface of the decentralized application. The user would be able to share the photos from his local database i.e from the user's device using IPFS protocol. IPFS is interplanetary file system protocol that would be used for uploading the data from the user's device to the blockchain. Uploading of the photo takes place in the following manner, the user selects the photograph which would be shared, then the photo will be uploaded to the Dapp (decentralized application) using IPFS protocol. For the upload made by the user, this transaction must be written to the blockchain. This is achieved by smart contracts which will update all the blocks in the blockchain about the new transactions made.

## 5. IMPLEMENTATION

In this project, we are creating a decentralized photo-sharing application using ethereum blockchain. We have used a truffle framework to create the project. There are several steps in the implementation of this project. Following steps consists of implementation

**Step 1:** first initialize an ethereum client. Here we have used Ganache as Ethereum client.

**Step 2:** Write the smart contracts for the creating account for user i.e. login and logout, to like the photograph, to comment on the photograph and to share the photograph.

**Step 3:** Write the tests for creating a user interface in JavaScript.

**Step 4:** Deploy or host the blockchain which is present on the localhost using https protocol via tunneling through ngrok for testing on the web browser of mobile phones.

**Step 5:** Deploy all the smart contracts on the blockchain using truffle framework.

## 6. CONCLUSION

Blockchain allows immediate contracts, engagements, and agreements with inherent, robust cyber security features. The Digital world has produced efficiencies, new innovative products, and close customer relationships globally by the effective use of mobile, IoT (Internet of Things), social media, analytics and cloud technology to generate models for better decisions. The Blockchain is recently introduced and revolutionizing the digital world bringing a new perspective to security resiliency, and efficiency of the system. The concepts are transferable to a wide range of industries as finance, government and manufacturing where security, scalability and efficiency must meet.

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