**Decentralized apps of the future implementing Web3**

**Abstract:** This paper hopes to explore the growing decentralized nature of the ever-changing plane of the Internet and the web technologies affecting web applications. The rise of Web 3.0, enabled by blockchain technology, provides an avenue to reclaim the Internet by disrupting infrastructures around storage, data exchange, financial transactions, and more. This upgrade to the Web reintroduces real ownership, verifiability, and opens the Web back up to secure peer-to-peer interactions. In a way, most open crypto projects can be regarded as part of Web 3.0, but we’d like to highlight a few projects that are particularly focusing on disrupting the Web.

**Introduction**

The web has changed a lot in recent years, and its operating technologies are almost now unknown from its earliest days. Web Appearance is usually divided into three different categories: Web 1.0, Web 2.0, and Web 3.0.

Web 1.0 was the first iteration of the web. It contained sites that provided static content instead of dynamic HTML. Data and content are provided from a static file system rather than a database, and the sites did not have much interaction. Web 1.0 lasted from 1991 to 2004. In the world of Web2, you do not have to be a designer to participate in a creative process. Most apps are designed in a way that easily allows anyone to become a creator. It's simple, in fact, and because of its simplicity, many people around the world become creators. The web in its current form is good in many ways, but there are places where we can do much better. There are a few basic differences between Web2 and Web3, but power allocation is its core. Web3 is improving the internet as we know it today with a few additional features like Trustless, Self-Representative, Permissionless.

On Web3, developers build and run applications running on the same server or storing their data in a single database (usually hosted and managed by a single cloud provider). Instead, Web3 applications work on blockchains, low-level multi-peer networks (servers), or a combination of the two that form the crypto-economic protocol. These applications are often called dApps (distributed applications).

Decentralized applications (dApps) are Web3 implemented and available now. DApps are applications that exist and use a blockchain or P2P network of computers instead of a single computer, and outside view and control of a single authority. In the context of cryptocurrencies, dApps operate on a blockchain network in a public, open source, low-level environment and are free from the control and interference of any single administrator.

**Literature Reviews**

Web 3.0 is an Internet where users control ownership, data and money. Web3 has the ability to change contracts and exchange rates. It changes the structure of the data behind the Internet, introducing a global domain, by encouraging network players with a brand.

The Internet we use today builds on the concept of personal computers. Data is stored locally and managed on trusted corporate servers. The information on these servers is protected by firefighters, and system administrators are required to manage these servers and their firewalls. Trying to manipulate data on a server is like breaking into a house, where security is compromised by telephone and alarm systems. A centralized network has a single source of truth, thus a single point of failure. The state of the network now can be viewed as “Data Monarchy” whereas the state of the decentralized web where data is distributed can be viewed as “Data Democracy”.

On Web3, data is stored on multiple copies of the P2P network. The rules of governance are legally enshrined in the protocol and are widely protected by all network participants, who are promoted by the traditional network token through their activities. Blockchain, as the backbone of Web3, redefines the data structures behind the Web, now that we live in a connected world. Introduces a management platform that works beyond the current Internet, allowing two people who do not know or trust each other to access and resolve agreements via the Web.

Dapp has its own backend code that works on a separate peer-to-peer network. Compare this to an application where the backend code works on central servers. Dapp can have a frontend code and a user interface written in any language (like the app) that can make calls to its backend. In addition, its front end can be hosted on a shared storage such as IPFS.

The core principles of Dapps are

* **Decentralized** means they are independent, and no one can control them as a group.
* **Deterministic** i.e., they perform the same function irrespective of the environment in which they are executed.
* **Turing complete**, which means given the required resources, the dapp can perform any action.
* **Isolated**, which means they are executed in a virtual environment known as Ethereum Virtual Machine so that if the smart contract happens to have a bug, it won’t hamper the normal functioning of the P2P network.

1. **Research Paper summaries**
   1. **Web3 and the Creative Industries: How Blockchains Are Reshaping Business Models**

This paper discusses emerging web technologies and how it is reshaping the creative industry around the globe. Web3, powered by blockchain technology, is a digital infrastructure progression in which protocol-enforced consensus mechanisms enable direct (peer-to-peer) value exchange between users, obviating the need for trusted middlemen. Existing blockchain projects are attempting to construct artist-centric business models by demolishing the agency-centric business models that facilitated the financial crisis. Blockchain technology allows artists to define the conditions of their market involvement by automating payments, licensing, intellectual property management, contracting and governance, and digital content storage and access. The emergence of a decentralized "internet of value" has the potential to alter the economic structures of the creative industries.

The amount to which these infrastructures affect creative people and cultural goods may be determined by existing institutions' adaptive reaction to technological opportunities (including law, philanthropy, and finance), while change may occur independently of institutional efforts. As a result, a research agenda for Web3 creative industries would build on the current understanding of creative labor, policy, and financing models, as well as the distribution and access implications of technological development. Case studies from music (Ujo-music and dotblockchain), collectibles (cryptokitties), visual arts (dada. nyc), and narrative (Cellarius) are discussed in this paper, as well as policy implications and research questions that arise. Some of these experiments are attempting to destabilize the digital economy more extensively and to create avenues for values-based markets that would provide creators with alternatives to commercially-oriented revenue sources, in addition to offering new approaches for buying and selling creative works with implications for how creative production is compensated.

Blockchains are not just a digital technology but more fundamentally a new institutional or governance technology out of which new types of economic systems can be built. They could enable us to 'tokenize' the arts and cultural sector by making use of cryptocurrencies, smart contracts, Dapps, DAOs, and other new blockchain-governed economic infrastructure to coordinate and incentivize creative production and consumption.

* 1. **FileShare: A Blockchain and IPFS framework for Secure File Sharing and Data Provenance**

In this paper, we introduce a Web3 standards data storage application, FileShare – a safe decentralized file share application framework. It overcomes the integrity and ownership issues in the existing solutions for file sharing and data provenance. Blockchain is considered to be a distributed registry that anybody may access throughout the world to verify stored data with great integrity, resilience, trustworthiness, and traceability. Smart contracts that are self-executing contracts may be copied, shared, and regulated by a network of computers that operate on the blockchain using distributed ledger technology. In the suggested paradigm, Ethereum is responsible for user registration and provenance via a Decentralized application (dApp). Ethereum Smart Contract is utilized in the management, management, and traceability of shared content history from its source to the current version.

It leverages the distributed file system IPFS as its data storage layer, preventing the drawbacks of monolithic storage technologies. A built-in editor for viewing and modifying files is used in the framework presented. The files can only be read in the FileShare text editor, they are saved in an encrypted form on IPFS. Modification and sharing of shared file activities are recorded on the blockchain independently, guaranteeing great integrity, resilience, and transparency. IPFS is a protocol and peer-to-peer network for storing and sharing data in a distributed file system. IPFS uses content-addressing to uniquely identify each file in a global namespace connecting all computing devices. IPFS allows users to host and receive data in the same way that BitTorrent does. IPFS is based on a decentralized system of operators that retain a piece of the data overall and provide a robust system of file storage and sharing, in contrast to a central-set server. Every network user can provide a file by his/her content address and other network partners will be able to identify and request the content of any node using a distributed hash table (DHT).

The FileShare application offers a safe, tamper-proof mechanism for file sharing in a distributed file system. The provenance data can be used to obtain analytical information. The data from the source can be used for analysis. The file owners who made the document public can access analytical data on how many individuals saw the file. The private file owners can continue to access the modifications made by the individuals with whom the file has been shared. The owner of the files may be easily traced, preventing ownership issues. Furthermore, because the provenance data is kept on the blockchain, an immutable record is created, and any malicious alterations to the provenance data can be averted.

* 1. **Two-factor authentication framework based on ethereum blockchain with dApp as token generation system instead of third-party on web application**

This paper discusses one of the biggest implementations of blockchains i.e., ethereum. Ethereum is a distributed computing platform based on the Ethereum blockchain that supports smart contracts. The Ethereum Virtual machine (EVM) provides a decentralized virtual machine, which can execute peer-to-peer contracts with the cryptocurrency of ether. Vitalik Buterin, a cryptocurrency researcher and programmer, originally suggested Ethereum in late 2013. During July–August 2014, development was financed through online crowd sales. This paper describes a unique approach for Multi-factor authentication (MFA). It is a computer access control system where the user is given access only after successfully introducing different pieces of evidence on the authentication machine - usually at least the following two categories: information (something they know); management (something they have), and birth (something they are). Two-factor authentication (also known as 2FA) is a way to verify the user's desired identity using a combination of two different components. Two-factor authentication is a form of multi-factor authentication.

Authentication is a way to ensure an account by validating the identity of the user by entering a password through e-mail. An Authentication System that combines the first-factor authentication with the second factor is two-factor authentications. Two authentication factors are generally comparable by inputting an email or a passWord username. However, two authentication factors demand extra user input information. You can use tokens or one-time passwords for additional information (OTP).

Two-factor authentications still create a token using third-party services or OTP since they can rob from tokens via MITM and determined that the generated tokens have the same value. Therefore we propose an ethereum blockchain two-factor authentication architecture with dApp as a token creation method. The results from the examination of the system were first established without involving third parties and were then successful in developing a two-factor authentication method. Second, in one second, token systems produce up to 3164 tokens and are checked for colliding. Thirdly, the token protection mechanism against MITM attacks.

DApp user authentication makes the attacker impossible to access all the checks. Even if there are multiple credentials in question at the same time, there can be a whole group of trusted actors which could take control of the same user. Additionally, the attacker won't be able to directly interact with the computer using any other services.

* 1. **ABCDE - Agile BlockChain Dapp Engineering**

This paper discusses Cryptocurrencies and their foundation technology, The Blockchain cryptocurrencies are transforming finance and business, enabling a decentralized method that enables confident applications with no trusted counterpart. Mainly, Smart contracts. It is computerized agreements that simplify, validate, or enforce the negotiation or execution of the contract, or that make the clause of the agreement unnecessary. Smart contracts often have a user interface and often mimic the concept of contract clauses. Sponsors of smart contracts claim that many types of contract clauses can be done in part or in full force, compulsion, or both. Wise contracts aim to provide security in addition to the traditional contract law and to reduce other transaction costs associated with the contract.

More recently meanwhile, the Blockchain and the Smart contracts programming, in all the industries demanding confidence and accurate certificates, are finding more and more apps. Some individuals are here to argue that the "Blockchain Revolution," in their early days, can be compared with the Internet and the Web. This results in an incredible rate of growth for all software developments around blockchain technology. The feeling of software engineers that Blockchain technologies are of such great interest is that they develop unregulated and hurried software, a kind of first-come-first-served competition that does not guarantee either the quality of software or take the fundamental concept of software engineering into account. The paper attempts to address this problem by presenting a software development process to collect Blockchain applications, assess, design, create, test, and deploy them. The process is based on several Agile Practices including User Stories and, iterative and progressive development.

One of the primary new developments in software development is the so-called "decentralized apps" or "dApps." DApps usually run on a blockchain, the Bitcoin digital currency technology originally launched. In peer-to-peer nets, the Blockchain software works naturally in a redundant, transparent and decentralized way. A few years after Bitcoin was launched in 2009, developers and management have discovered that a blockchain can also be suitable for a decentralized PC. This led to Ethereum blockchain, a network with Turing-complete programs that also operate nodes known as 'Smart Contracts' (SCs) following Nick Szabo's idea. The SCs, despite having some particular capabilities, are general computer programs. The primary idea behind them is that they can be utilized without having to trust a central authority and without time and space restrictions for the automatic execution of the contractual obligations. There is therefore a large wave of interest in SCs and blockchain applications, particularly in the economic sphere.

However, more formal notes are also used, for example, UML graphs outlining the system design, with the addition of special concepts discovered in the creation of Blockchain. A nice example of how it works is presented and detailed in full.

* 1. **A Study on ĐApps Characteristics**

This paper discusses the smart contracts of the top 10 ranked DApps, according to DApp Radar based on the number of users, on Ethereum to combine the analysis of the blockchain network with one of the repositories.

The development of software applications has switched to convenient interface sets of application programming interfaces. In the past years, most of these APIs have developed into managed platforms, especially in the cloud computing arena, where Platform-as-a-Service (PaaS) has become a prominent paradigm for applications [GDB19]. After the trend toward smaller computer units, flavors like function-as-a-service (FaaS) have emerged where every function is performed separately, but connected to stately backgrounds in a seldom changeable environment. With the developers, the ensuing simplicity and reuse factor resonate strongly.

In software development communities, repositories are significant measures of vitality and maturity. It is used to construct user-facing applications or reusable devices. While they are rarely decentralized, for decentralized applications they are crucial to host code. In this study, we analyze public repositories that run on heterogeneous blockchain platforms dedicated to decentralized applications, or -D - Apps. The first study is to report aggregate metrics of the repository level and application-level features, including metadata for -D- applications, the associated composition of smart contracts, and incoherence across repositories in both scheme and content.

Cloud and blockchain technologies are becoming increasingly complex, such as using cloud computing to find evidence [PNBT19] and mimicry of largescale community blockchains in a few node clouds [WAYZ19]. This raises questions about how to build blockchain applications with the same and reusable benefits known from today's cloud delivery models. After defining the application policy and identifying the actors, the program is divided into two parts, the smart contract system and the preliminary conclusion of the enabled program. This paper investigated DApps at the level of smart contracts, excluding archives, by removing all blocks in the Ethereum blockchain and filtering contracts created on these blocks.

The major contributions are data collection tools and a developing public dataset together with an initial analysis for replicable key metrics. The insights presented include Ethereum's supremacy, the absence of smart contracts for a substantial fraction of the applications, and the absence of popular repositories to promote an underutilized application. Developers can use the insights to construct high-quality and popular applications and to create the appropriate quality controls.

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