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WEB ACCESSIBILITY – CSCE843
(Softcore)

TASK-9

WEB 3

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Web 2 vs Web 3(Comparison)

Aspect of Comparison	Web2	Web3
Data ownership	Centralized entities own and verify the data.	Users (nodes) own and verify the data
Mode of access	Credentials like username, email and password are required.	The wallet address is required.
Computation Cost	Requires high computational resources as multiple third-party entities are involved.	Requires low computational resources compared to centralized systems.
Structure	Represents a centralized infrastructure where participants are connected to an authority.	Represents a decentralized infrastructure, consisting of node and networks that are resposible for data validation.
Participation	Centralized authority approves the participants.	Participants are free to join the network.
Censhorship	Yes, since intermediaries are involved	No censhorship
Single point of failure	Chances for a single point of failure resulting from easy entry to malicious participants.	No room for single point of failure since the network is decentralized.
Efficiency	Low performance	High performance

Web 3.0 Technology:

WEB 3

- ➢ Web 3.0 is also known as web3
- ➢ It is the third iteration or version of the Internet that interconnects data in a decentralized way to deliver a faster and more personalized user experience.
- ➢ It is built using artificial intelligence, machine learning and the semantic web.
- ➢ It uses the blockchain security system to keep information safe and secure.

Key Features of web 3.0:

- ➢ **Open** – It's open-source software developed by an open and available community of developers and accomplished in full view of the public access.
- ➢ **Trustless** – The network offers freedom to users to interact publicly and privately without an intermediary exposing them to risks, hence this is a "trustless" data.
- ➢ **Permissionless** – Anyone users and providers, can engage without the need for permission from a controlling organization.
- ➢ **Ubiquitous** – Web 3.0 will make the Internet available to all of us, at any time and from anywhere. At some point, Internet-connected devices will no longer be limited to computers and smartphones, as they are in web 2.0. Because of the IoT technology will enable the development of a multitude of new types of intelligent gadgets.

Layers of Web 3.0

There are four new layers of web 3.0 are:
1) Edge computing
2) Decentralization
3) Artificial Intelligence & Machine Learning
4) Blockchain

1) Edge Computing
- ➢ While currently commoditized personal computer technology was modified in data centers in web 2.0, the shift to web 3.0 is moving the data center out to the edge (that is edge computing) and sometimes straight into our hands.
- ➢ Data centers are complemented by an array of advanced computing resources distributed among phones, laptops, appliances, sensors and cars, which will produce and consume 160 times more data in 2025 than in 2010.

2) Decentralized Data Network
- ➢ Decentralized data networks enable various data generators to sell or trade their data without losing ownership, risking privacy or relying on intermediaries. As a result, decentralized data networks will have a long list of data providers in the growing 'data economy.'
- ➢ For example, when you log in to an app using your email and password, or when you like a video or ask Alexa a question, all these activities are tracked and monitored by tech giants such as Google and Facebook to better target their advertisements.
- ➢ However, in web 3.0, data is decentralized which means that users will own their data. Decentralized data networks enable various data generators to sell or trade their data without losing ownership, risking privacy or relying on intermediaries. It enables you to log in securely over the Internet without getting tracked by using Internet Identity.

3) Artificial Intelligence & Machine Learning

- Artificial intelligence and machine learning algorithms have advanced to make valuable, and sometimes life-saving, predictions and acts.
- When built on top of emerging decentralized data structures that provide access to a plethora of data that today's tech titans desire, the possible applications extend far beyond targeted advertising into areas such as:
    - Precision materials
    - Medication creation
    - Climate modelling

4) Blockchain

- In simple terms, blockchain is one more layer of technology behind web 3.0. More specifically, it is the foundation of web3, as it redefines the data structures in the backend of the semantic web.
- Blockchain is a decentralized state machine that deploys intelligent contracts. These smart contracts define the logic of an application for web 3.0. So anyone who wishes to build a blockchain application needs to deploy their application code on the shared state machine.

Working of Web 3.0:

- The idea behind web 3.0 is to make searches on the Internet much faster, easier and more efficient to process even complex search sentences in no time.
- In a web 2.0 application, a user has to interact with its frontend, which communicates to its backend, which further communicates with its database. The entire code is hosted on centralized servers, which are sent to users through an Internet browser.
- Web 3.0 has neither centralized databases that store the application state nor a centralized web server where the backend logic resides. Instead, there is a blockchain to build apps on a decentralized state machine and maintained by anonymous nodes on the web.
- Anyone willing to build a blockchain application deploys their code on this shared state machine. The front end remains almost the same as in web 2.0.

Web 3.0 Architecture

- ❖ Web3 represents a serverless internet architecture, generally called a decentralized web, that strives to provide data access and management rights to the users rather than any centralized entity.
- ❖ Web3's architecture has five core layers are:
    - ✓ Layer 0
    - ✓ Layer 1
    - ✓ Layer 2
    - ✓ Layer 3
    - ✓ Layer 4

Web 3.0 Architecture Layers

- ➤ Layer 0
  - Peer-to-peer network protocols like Devp2p, Libp2p
  - Platform neutral computation languages like WASM, EVM, and UTXO

- ➤ Layer 1
  - Decentralized data storage and distribution protocols.
  - Example- IPFS, Bluzelle, Fluence, Swarm
  - Trustless web3 interaction platforms.
  - Example- Polkadot
  - Trustless interaction protocols.
  - Example- Ethereum, Bitcoin, Zcash, Polkadot parachains
  - Decentralized data messaging platforms.
  - Example- Whisper, Matrix

- ➤ Layer 2
  - Layer-2 protocols
  - Example- Bitcoin Lightning Network and the Ethereum Plasma.

- ➤ Layer 3
  - Developer languages and APIs
  - Example- Web3.js, ether.js, oo7.js, Solidity, Rust

- ➤ Layer 4
  - User- interface Frameworks
  - Example- Status, Metamask, MyCrypto, Parity

Advantages of Web 3.0

  1) Data Privacy and Control
  2) Seamless Services
  3) Transparency
  4) Open Accessibility to Data
  5) Restriction-less Platform
  6) Single Profile Creation
  7) Enhanced Data Processing
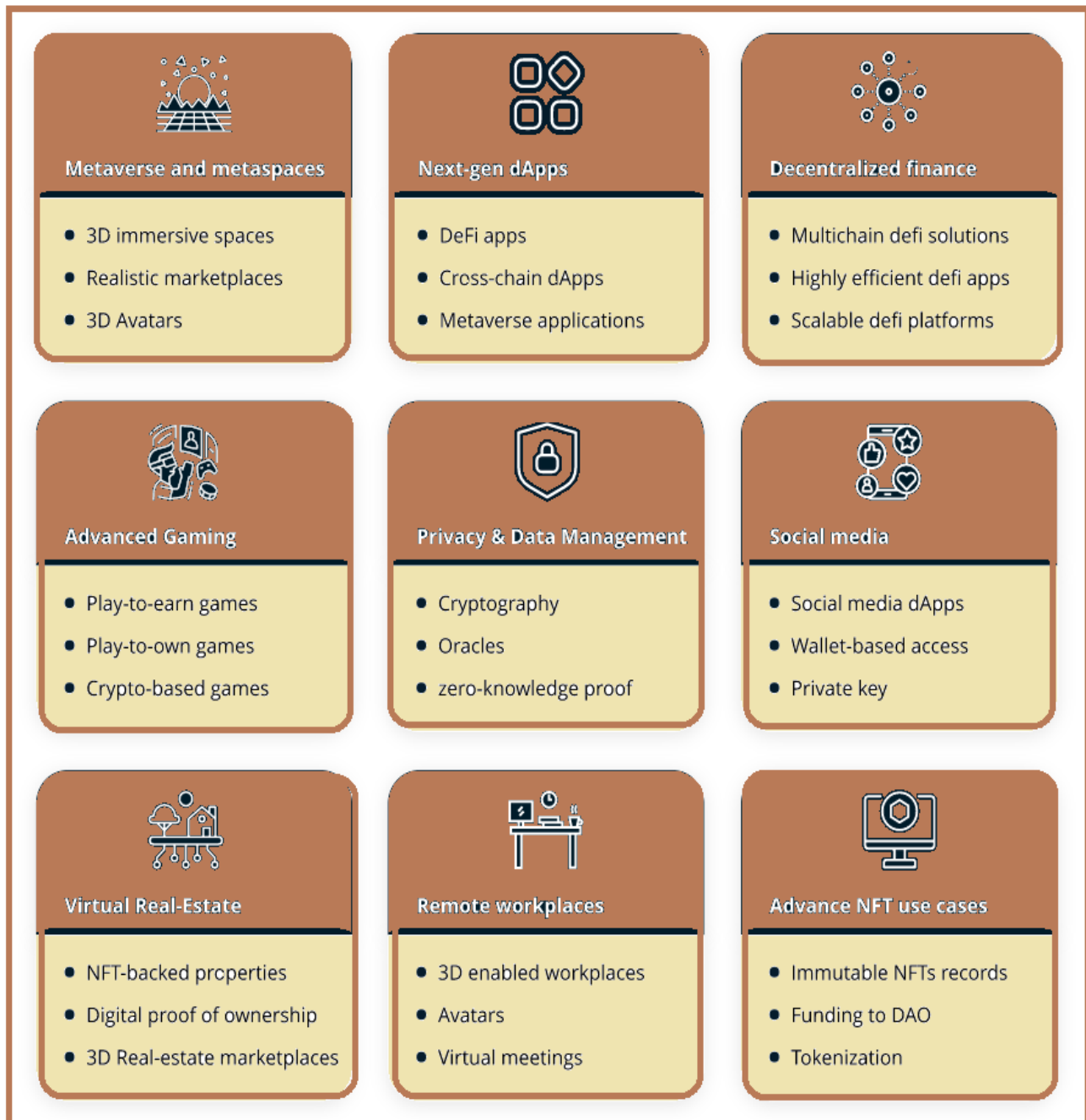
Disadvantages of Web 3.0

  1) Requires Advanced Devices
  2) Web 1.0 Websites Will Become Obsolete
  3) Not Ready for Widespread Adoption
  4) Demand for Reputation Management Will Increase
  5) Complicated Functionality

Web 3.0 Importance

- Less reliance on centralized repositories
- More personalized interactions
- Better search assistance powered by AI
- Reduced dependency on intermediaries
- Rise in peer-to-peer connectivity
- Enhanced trust

Examples of Web 3.0 in Real Time Applications

Metaverse and metaspaces
- 3D immersive spaces
- Realistic marketplaces
- 3D Avatars

Next-gen dApps
- DeFi apps
- Cross-chain dApps
- Metaverse applications

Decentralized finance
- Multichain defi solutions
- Highly efficient defi apps
- Scalable defi platforms

Advanced Gaming
- Play-to-earn games
- Play-to-own games
- Crypto-based games

Privacy & Data Management
- Cryptography
- Oracles
- zero-knowledge proof

Social media
- Social media dApps
- Wallet-based access
- Private key

Virtual Real-Estate
- NFT-backed properties
- Digital proof of ownership
- 3D Real-estate marketplaces

Remote workplaces
- 3D enabled workplaces
- Avatars
- Virtual meetings

Advance NFT use cases
- Immutable NFTs records
- Funding to DAO
- Tokenization

➢ Metaverse and Meta spaces

Metaverse is a virtual reality-based world that aims to merge the physical and the virtual world. While metaverse projects can be centralized or decentralized, based on web2, decentralized metaverse projects align with the need of the future. The metaverse projects can leverage the web3 ecosystem and its connectivity attributes to provide the users with an enhanced decentralized experience. Web3 further empowers the metaverse with technologies like IoT and artificial intelligence, enabling realism inside the metaverse.

➢ Next-gen dApps

Decentralized applications use blockchain technology and are not owned and controlled by any centralized entity. Web3 supports development that is advanced both in terms of features and usability. Web3 dApps can range from gaming, DeFi, NFT and metaverse. dApps designed for web3 projects are truly decentralized and interoperable. However, dApps for the blockchain ecosystem do not necessarily need to be interoperable unless the project demands so.

➢ Decentralized finance

As one of the top use cases of web3, DeFi leverages web3 attributes to improve its existing infrastructure and associated capabilities. Enterprises can combine the DeFi technology with the open and powerful web3 ecosystem to build futuristic DeFi solutions and applications and put them to use. Web3 brings many benefits to DeFi, including access to an open-source ecosystem, lower transaction fees, efficient transaction processing and more transparent and automated governance.

➢ Advanced Gaming

Web3 games represent the advanced version of blockchain-based games like play-to-earn, NFT, and play-to-own games. These web3 games use technologies such as blockchain, NFTs and underlying gaming infrastructure, contributing to the development of next-generation games that allows players to own, trade and create in-game assets to generate income from the game. Axie Infinity and Decentraland are the perfect examples of web3 games that have sparked high adoption across the player community. With changes in the web3 ecosystem, web3 games will also undergo considerable changes in the future.

➢ Privacy & Data Management

Blockchain is arguably the most prominent technology with the vision to decentralize the future. However, "complete transparency" sometimes causes concern among users related to privacy. Web3 enables blockchain infrastructure to implement innovative concepts like cryptography and zero-knowledge proof to exercise complete secrecy for enhanced privacy in decentralized digital infrastructures.

➢ Social media

Web3 empowers a new era of social media networks that emphasize the creator-driven economy with a core interest in providing content ownership to the users instead of any centralized entity. Web3 social media applications will introduce the next iteration of today's social media apps like Facebook, Instagram and Snapchat, requiring users to submit their data to an authorized entity. As a significant change, web3 apps enable anonymous access to the users via wallet address and private key.

➢ **Virtual Real-Estate**

The real estate industry has already transformed considerably with the advent of NFTs, blockchain and metaverse. Now with web3 providing a more robust and wider ecosystem for real estate, a range of "modern" web3 real-estate projects have been developed that use NFTs, virtual reality and 3D technology to verify ownership and transfer NFT-based real estate properties. Moreover, the transaction is recorded in the immutable and transparent ledger in the blockchain.

➢ **Remote workplaces**

Since web3 supports the development of high-end metaverse projects, companies are using web3 technologies to build 3D realistic workplaces that transform their physical workplaces, allow employees' avatars to work inside the virtual workplaces, interact with their colleagues and engage in fun activities just like the real workplaces.

➢ **Advance NFT use cases**

NFTs are an essential tool used in the blockchain. NFTs have plenty of use cases on the web3 ecosystem, like incentivizing the audience, granting people digital ownership, and recording immutable data on the blockchain. However, businesses have started raising money by tokenizing their companies, offering exclusivity and ownership on the blockchain, or starting a DAO community (a decentralized autonomous organization or an online community owned by its members).