Blockchain Study Notes Day 2:

Chapter 2 - How Blockchain Works

Introduction

Blockchain operates on a decentralized network, where participants validate and record transactions. It achieves consensus through mechanisms like Proof of Work (PoW) and Proof of Stake (PoS), ensuring data integrity and security.

Subtopics

---

1. Proof of Work Demo

What is Proof of Work (PoW)?

- A consensus mechanism used to validate transactions and add them to the blockchain.
- Requires participants (miners) to solve complex mathematical puzzles.
- The first miner to solve the puzzle gets to add the block to the blockchain and receives a reward (e.g., cryptocurrency).

How It Works:

1. **Transaction Broadcast**: Users initiate transactions.
2. **Mining Process**:
    - Miners compete to solve a cryptographic puzzle (finding a nonce that results in a hash below a target value).
3. **Block Validation**: The solved block is validated and added to the blockchain.
4. **Reward Distribution**: Successful miners are rewarded with cryptocurrency.

Demo Steps:

1. Simulate transaction validation using a hash generator.
2. Adjust nonce values to find a valid hash.
3. Observe how the block is linked to the previous block.
4. https://andersbrownworth.com/blockchain/hash

---

2. How People of Yapis Use Blockchain

Background:

- The Yapis, an island community, adopted blockchain for their traditional stone currency (Rai stones).
- Each stone represents value, but their physical location remains unchanged. Ownership is what matters.
- https://www.youtube.com/watch?v=oNhpm9NMVXs&t=1s

Blockchain Adoption in Yapis:

- **Ownership Records**: Blockchain records the transfer of stone ownership securely.
- **Transparency**: All transactions are visible, eliminating disputes over ownership.
- **Trust**: Even without moving the stones, people trust the records on the blockchain.

Benefits for Yapis:

- Enhanced trust within the community.
- Secure and transparent transaction records.
- Preservation of cultural practices with modern technology.

---

3. How Proof of Stake Works

What is Proof of Stake (PoS)?

- A consensus mechanism where participants validate transactions based on their stake (ownership) in the network.
- Validators are selected to propose and validate blocks based on the amount of cryptocurrency they hold and are willing to "stake" as collateral.

Key Differences from PoW:

- No mining required, reducing energy consumption.
- Validators are incentivized to act honestly; dishonest behavior results in losing their staked funds.

How It Works:

1. **Staking**: Participants lock a certain amount of cryptocurrency as a stake.
2. **Validator Selection**: The network selects a validator based on their stake and other factors like time since last validation.
3. **Block Proposal**: The selected validator proposes a new block.
4. **Validation and Reward**: If the block is valid, the validator is rewarded with transaction fees or new tokens.

Advantages of PoS:

- Energy-efficient compared to PoW.
- Increased scalability and speed.
- Lower barrier to entry for participants.

Conclusion

Understanding how blockchain works requires a grasp of its core consensus mechanisms like PoW and PoS. These mechanisms ensure secure and transparent transactions across decentralized networks. By exploring real-world applications, such as the Yapis' Rai stones, we see how blockchain technology blends with traditional practices to solve modern problems.

Day 2 Notes

Prepared by Munawar Johar