NodeOps Syndicate

Curriculum

📌 Web3 Blockchain Cohort (For DevOps Professionals)

Objective: Provide DevOps professionals with a deep understanding of blockchain technology, its components, and its practical applications.

📖 Module 1: Introduction to Blockchain & Web3

- Evolution of blockchain technology
- Key characteristics of blockchain (Decentralization, Immutability, Transparency)
- Understanding Layer 1 vs. Layer 2 solutions
- Overview of different blockchain architectures (Ethereum, Bitcoin, Cosmos, Polkadot, Solana, etc.)

📝 **Assignment:** Research and write a comparison report on two blockchain architectures of your choice.

📖 Module 2: Cryptography & Consensus Mechanisms

- Hash functions and Merkle trees
- Public and private key cryptography
- Digital signatures and zero-knowledge proofs (ZKPs)
- Consensus algorithms: PoW, PoS, DPoS, PBFT, and their trade-offs

📝 **Assignment:** Implement a simple hashing function and demonstrate how it works.

📖 Module 3: Smart Contracts & EVM

- What are smart contracts?
- Solidity fundamentals & smart contract security
- Ethereum Virtual Machine (EVM) deep dive
- Gas fees and optimization techniques

📝 **Assignment:** Write and deploy a basic smart contract on Ethereum Testnet.

📖 Module 4: Wallets & Key Management

- Overview of crypto wallets (Hot vs. Cold wallets)
- **MetaMask Deep Dive:**
  - Installing and setting up MetaMask
  - Adding a network (Ethereum, Polygon, Binance Smart Chain, etc.)
  - Managing private keys and security best practices
  - Getting testnet faucet tokens
- **Opening a Centralized Wallet:**
  - Creating an account on centralized exchanges (Binance, Coinbase, etc.)
  - Depositing and withdrawing funds
  - KYC process and security considerations

📝 **Assignment:** Set up a MetaMask wallet, add a testnet network, and receive faucet tokens.

📖 Module 5: Blockchain Transactions & Token Standards

- Anatomy of a blockchain transaction
- UTXO vs. Account-based models
- **P2P Transactions:**
  - Sending and receiving crypto assets
  - Using wallet addresses and QR codes
  - Transaction fees and confirmations
- **Transaction Analysis:**
  - Understanding transaction hash, nonce, gas price, and gas limit
  - How to analyze transactions on blockchain explorers (Etherscan, BSCScan, etc.)
  - Debugging failed transactions
- ERC-20, ERC-721, ERC-1155 token standards
- DeFi protocols and their mechanisms (DEXs, AMMs, Lending/Borrowing)

📝 **Assignment:** Perform a P2P transaction on a testnet and analyze the transaction details on a blockchain explorer.

📖 Module 6: Zero-Knowledge Proofs & Privacy in Blockchain

- Introduction to ZKPs and their significance
- zk-SNARKs vs. zk-STARKs

- Applications of ZKPs in privacy-focused blockchains (Zcash, Aztec, etc.)
- Rollups: ZK-Rollups vs. Optimistic Rollups

📝 **Assignment:** Write a summary on how ZKPs enhance blockchain privacy and their real-world use cases.

📖 Module 7: Blockchain Governance & DAOs

- On-chain vs. Off-chain governance models
- DAO fundamentals: Treasury management and voting mechanisms
- Notable DAO case studies (MakerDAO, Uniswap, Aragon)
- The role of governance tokens in decentralized decision-making

📝 **Assignment:** Research and analyze a DAO's governance structure and decision-making process.

📖 Module 8: Real-World Applications & Capstone Project

- Decentralized Identity (DID) and Self-Sovereign Identity (SSI)
- NFTs beyond art: Gaming, real estate, and intellectual property
- Capstone project: Deploying a smart contract & interacting with it via a blockchain wallet
- Presentations & peer reviews

📝 **Assignment:** Develop and present a real-world blockchain use case as your capstone project.
