**Week 4**

**4.1 Solana Jargons, Programming Models, Tokens**

* Solana and Ethereum have one thing extra than Bitcoin which is smart contracts.
* Bitcoin was the first ever blockchain, then people started creating their own blockchains.
* When ETH came, it said that everyone else would die out. Please come on our blockchain and start building from there. This is smart contract. ETH introduced it first. So, new coins would not have the cold start problem.
* They are called smart contracts on ETH and programs on SOL. However, SOL is much faster than ETH. Generally, we see that ETH has won over bitcoin.
* Accounts on SOL can also store some data as well as some SOL.
* On SOL, programs are a special account that can store some executable code.
* Programs are stored on a different type of account and data is stored on a different type of account. There are different types of accounts on the SOL blockchain.
* 3 types of accounts: Lamports, Data + Lamports, Programs + Lamports.
* Programs + Lamports is called Token program.
* One thing you also look at is the owner through the assigned program id.
* You have to pay rent for the data and the program that you keep on the SOL blockchain. If you keep the minimum amount required, you would be rent exempted (rent-exempt minimum), otherwise you would be charged a rent. Rent is refundable.
* Some commands on the SOL CLI hit RPC servers.
* Generate key pair 🡪 solana-keygen new
* Solana CLI picks up the private key from here: /Users/muhammadsaad/.config/solana/id.json
* solana address gives you your public address.
* solana config get 🡪 return config for local solana
* Mainnet is the main blockchain, devnet is the developer blockchain. There is also a testnet. Devnet also has an accompanying RPC URL.
* Airdrop means you can have some solana for free in the devnet.
* solana config set --url <https://api.devnet.solana.com>
* solana balance to get the balance
* If you want to run solana blockchain locally, then you use testnet.
* solana-test-validator
* solana config set --url http://127.0.0.1:8899 🡪 For setting RPC URL to local testnet.
* You first deploy on testnet (locally), then devnet, then mainnet.
* High level, smart contracts are backend applications deployed on the blockchain.
* When you deploy the code in Web3, it is deployed on the Token program account. The data is stored in different accounts.
* In ETH, the code and the data sort of exist together but in SOL the data and the code are in different accounts.
* In SOL if a new user signups, then a new account is created to store their data and the user pays the rent for this account on their own. Similarly, if they create a Todo, then a new account is also created. This is all linked using PDAs 🡪 Program Derive Addresses.
* Coins and tokens are almost the same thing.
* USDT and USDC are not blockchains.
* In ETH blockchain, you deploy the contract using ERC-20 which is a template by the ETH.
* USDT/USDC are just derived accounts from the smart contracts on SOL blockchain. These are called mint accounts. Minting a token means creating a new token.
* Solana token program is executable, the mint accounts are just simple accounts. Mint accounts are also called tokens.
* spl-token create-token sends a request to a RPC which in turn tells the blockchain to create a new mint account.
* spl-token create-token --decimals 4 creates a token whose least amount sendable is 0.0001.
* spl-token create-token --decimals 0 creates a Non-Fungible Token.
* Default number of decimals is 9.
* The space taken by this mint account is 82 bytes. It stores things like what is the number of decimals, who is the owner, etc.
* We can set Mint Authority to null so that developer can’t print any more money.
* We create an associated account for a user for that specific token program and that specific token mint. Imagine mint as SBP and associated account as user’s personal bank account.
* 5ijAUcBek3iT1KuZbkhMSZQX8Fyr7WaLLCWLxMBBnTSh 🡪 Mint/SBP
* spl-token supply 5ijAUcBek3iT1KuZbkhMSZQX8Fyr7WaLLCWLxMBBnTSh
* spl-token create-account 5ijAUcBek3iT1KuZbkhMSZQX8Fyr7WaLLCWLxMBBnTSh 🡪 This creates your associated account because you have your own public address (solana address) stored in your mac machine.
* spl-token mint 5ijAUcBek3iT1KuZbkhMSZQX8Fyr7WaLLCWLxMBBnTSh 100 🡪 sent 100 of my unknown token to my account.
* When I send 50 of my unknown token to a friend who does not have an associated account on my token, then some SOL would be deducted and an associated account for them would be created.
* Token-2022 is a new program replacing Solana Token Program which lets you attach metadata.

