Solana’s Architecture:

At the heart of Solana’s architecture are clusters - a set of validators working together to process transactions and maintain a single ledger. Solana has several distinct clusters, each serving a specific purpose:

* Localhost: a local development cluster found at the default port 8899. The Solana Command-line Interface (CLI) comes with a built-in test validator that can be customized according to an individual developer’s needs without requiring any airdrops or experiencing rate limits
* Devnet: a consequence-free sandbox environment for testing and experimenting on Solana
* Testnet: a testing ground for Solana’s core contributors to trial new updates and features before they reach mainnet. It is also used as a testing environment for developers wanting to run performance tests
* Mainnet Beta: the live, permissionless cluster where real-world transactions occur. This is the “real” Solana where users, developers, token holders, and validators interact daily.

Imagine clusters as a monolithic heap of data. In computer science, a heap refers to a memory region where data can be stored and modified dynamically. It is important to note, however, that clusters do not literally use a heap data structure. This analogy serves as a conceptual tool to aid in the understanding that clusters consist of various memory regions that can be allocated and deallocated when needed. Understanding clusters as a dynamic heap is key to understanding how data is managed, accessed, and secured within the network.

All state lives in this heap, even programs. Each region has a program that owns it and manages it accordingly. Programs, for example, are owned by the BPFLoader, a program responsible for loading, deploying, and upgrading on-chain programs. We refer to these memory regions, our digital warehouse’s boxes, as accounts.

What are Accounts?

Everything on Solana is an account. Think of accounts as containers that hold data persistently, much like files on a computer. They are the building blocks of Solana’s program model used to store state (i.e., the account’s balance, ownership information, whether the account holds a program, and rent information).

There are three types of accounts on Solana:

Accounts that store data

Accounts that store executable programs

Accounts that store native programs

These types of accounts can be distinguished further based on their capabilities into:

Executable accounts - accounts that are capable of running code

Non-executable accounts - accounts used for data storage without the ability to execute code (because they don’t hold any code!)