What are Solana Programs?

Solana Programs, often referred to as "smart contracts " on other blockchains, are the executable code that interprets the instructions sent inside of each transaction on the blockchain. They can be deployed directly into the core of the network as Native Programs , or published by anyone as On Chain Programs . Programs are the core building blocks of the network and handle everything from sending tokens between wallets, to accepting votes of a DAOs, to tracking ownership of NFTs.

Both types of programs run on top of the Sealevel runtime , which is Solana's parallel processing model that helps to enable the high transactions speeds of the blockchain.

Key points#

- Programs are essentially special type of Accounts
- that is marked as "executable
- "
- Programs can own other Accounts
- Programs can only change the data
- or debit
- accounts they own
- Any program can read
- or credit
- another account
- Programs are considered stateless since the primary data stored in a program
- account is the compiled SBF code
- Programs can be upgraded by their owner (see more on that below)

Types of programs#

The Solana blockchain has two types of programs:

- Native programs
- On chain programs

On chain programs#

These user written programs, often referred to as "smart contracts " on other blockchains, are deployed directly to the blockchain for anyone to interact with and execute. Hence the name "on chain"!

In effect, "on chain programs" are any program that is not baked directly into the Solana cluster's core code (like the native programs discussed below).

And even though Solana Labs maintains a small subset of these on chain programs (collectively known as the Solana Program Library), anyone can create or publish one. On chain programs can also be updated directly on the blockchain by the respective program's Account owner.

Native programs#

Native programs are programs that are built directly into the core of the Solana blockchain.

Similar to other "on chain" programs in Solana, native programs can be called by any other program/user. However, they can only be upgraded as part of the core blockchain and cluster updates. These native program upgrades are controlled via the releases to the different clusters .

Examples of native programs include#

- System Program
- :
- Create new accounts, transfer tokens, and more
- BPF Loader Program
- :
- Deploys, upgrades, and executes programs on chain
- Vote program
- :
- Create and manage accounts that track validator voting state and rewards.

Executable#

When a Solana program is deployed onto the network, it is marked as "executable" by the [BPF Loader Program](#) . This allows the Solana runtime to efficiently and properly execute the compiled program code.

Upgradable[#](#)

Unlike other blockchains, Solana programs can be upgraded after they are deployed to the network.

Native programs can only be upgraded as part of cluster updates when new software releases are made.

On chain programs can be upgraded by the account that is marked as the "Upgrade Authority ", which is usually the Solana account/address that deployed the program to begin with.