Foundry: A Smart Contract Development Framework

Foundry is a powerful and comprehensive tool for building, testing, and deploying smart contracts. It's a popular choice for developers of decentralized applications.

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Installation

The installation process is simple and straightforward. Use the provided curl command to download and execute the Foundry installer script.

Command

```
curl -L https://foundry.paradigm.xyz | bash
```

Project Initialization

Foundry provides a simple command to initialize a new project with basic configuration and folder structure.

1

forge init

Initializes a new Foundry project in the current directory.

2

forge init --force

Overwrites an existing project if one already exists in the current directory.

Configuration

Foundry uses a configuration file, foundry.toml, to customize the project's behavior, such as setting the Solidity compiler version and specifying formatting rules.

Solidity Version

\[profile.default]
solc_version = "0.8.17"

VS Code Formatting

Install Solidity extension
Add settings to VS Code

Forge fmt

Run command to automatically format code

Contract Deployment

Forge provides a convenient script for deploying contracts to a blockchain network. This approach simplifies the deployment process and ensures consistent execution.

1

forge create

Deploy a contract using a forge script

2

--rpc-url

Specifies the URL of the blockchain network to connect to

3

--interactive

Enables interactive mode for confirmations and inputs during deployment

Foundry Scripts

Foundry scripts are powerful tools for automating interactions with smart contracts, enabling tasks like deployment, testing, and data manipulation.

1

Import

Import forge-std for essential functions and utilities

2

Transactions

Use vm.startBroadcast() and vm.stopBroadcast() to manage transaction execution

3

Execution

Run scripts using the forge script command with options for specifying the network, broadcasting transactions, and providing private keys

Command Line Transaction Calls

Foundry offers a command-line interface (CLI) for interacting with deployed contracts, allowing for sending transactions and retrieving data.

1. **send**
   Sends a transaction to a contract function
2. **call**
   Executes a contract function without sending a transaction
3. **cast**
   Provides tools for data conversion and manipulation

Compilation

Foundry automates the compilation process, ensuring that the Solidity code is compiled into bytecode ready for deployment on the blockchain.

1

forge build

Compiles all Solidity contracts in the project

Testing

Foundry provides a comprehensive testing framework that simplifies the process of writing and executing tests for smart contracts, enhancing code quality and reliability.

1

Test Contracts

Create test files in the test directory, inheriting from the Test contract

2

Testing Structure

Use setup, success, and fail tests, as well as event checks

3

Helper Methods

Utilize functions like vm.prank(), vm.deal(), and vm.warp() for advanced testing scenarios

4

Running Tests

Use the forge test command with various options for filtering tests, controlling verbosity, and enabling advanced features

Third-Party Libraries

Foundry integrates well with popular third-party libraries, simplifying development and enabling developers to leverage pre-built components for common functionalities.

forge install	Installs a library from a package manager
forge update	Updates installed libraries to newer versions
forge remove	Removes installed libraries
remapping.txt	Configures paths for libraries, such as OpenZeppelin