Catena Blockchain Development Suite

User Manual

This user manual provides a guide for using the Catena Blockchain Development Suite (CBDS) as a virtual machine (VM) hosted on the Department of National Defence (DND) computing infrastructure.

The Catena Blockchain Development Suite provides all the necessary tools to develop blockchain applications (smart contracts) using the Ethereum platform. These tools include Remix, an integrated development environment for writing and debugging smart contracts; Ganache, a convenient interface to create a personal private blockchain; and Truffle, a suite of command line tools for deploying and testing smart contracts. Additionally, this user manual has been provided to help get started with Ethereum development.

Note: This VM requires that ports 8080, 8081, and 7545 be open. This may already be configured by your system administrator.

Ethereum

Ethereum is a decentralized platform that runs smart contracts: applications that run exactly as programmed without any possibility of downtime, censorship, fraud or third-party interference.

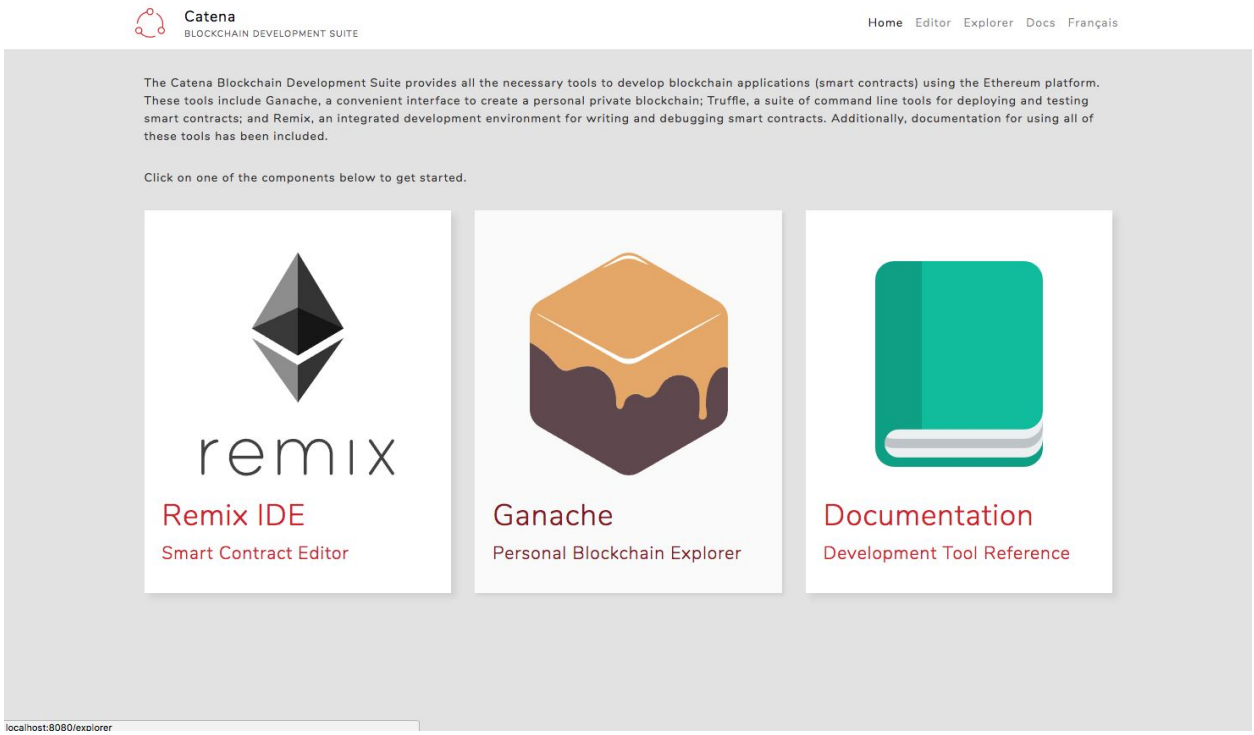
These apps run on a custom built blockchain, an enormously powerful shared global infrastructure that can move value around and represent the ownership of property.

This enables developers to create markets, store registries of debts or promises, move funds in accordance with instructions given long in the past (like a will or a futures contract) and many other things that have not been invented yet, all without a middleman or counterparty risk.

Further documentation: https://www.ethereum.org/

Getting Started

Determine the address of your VM (either an IP address, hostname or other domain) and enter it into the address bar of your web browser followed by `:8080` (e.g. `172.16.45.131:8080`). If you see the following screen you're ready to begin.

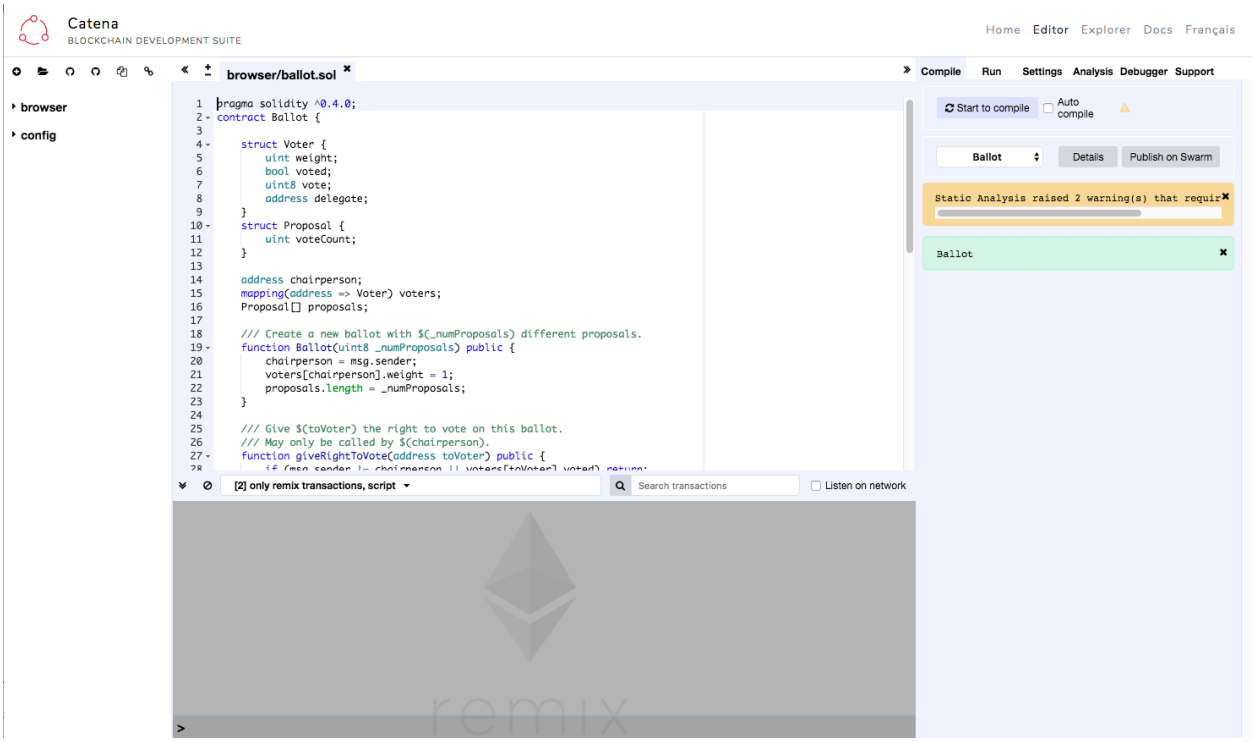


Tools

Each of these tools are powerful on their own, but together they form a comprehensive solution for Ethereum blockchain development. Additionally, the CBDS automatically connects all components together to provide a seamless developer experience and reduce setup time.

Remix

Remix is a browser-based compiler and IDE that enables users to build Ethereum contracts with Solidity language and to debug transactions.



*Note: The **Debugger** feature does not work with Ganache. Please switch your environment to **JavaScript VM** in the **Settings** tab to use it.*

Solidity

Solidity is a contract-oriented, high-level language for implementing smart contracts. It was influenced by C++, Python and JavaScript and is designed to target the Ethereum Virtual Machine (EVM).

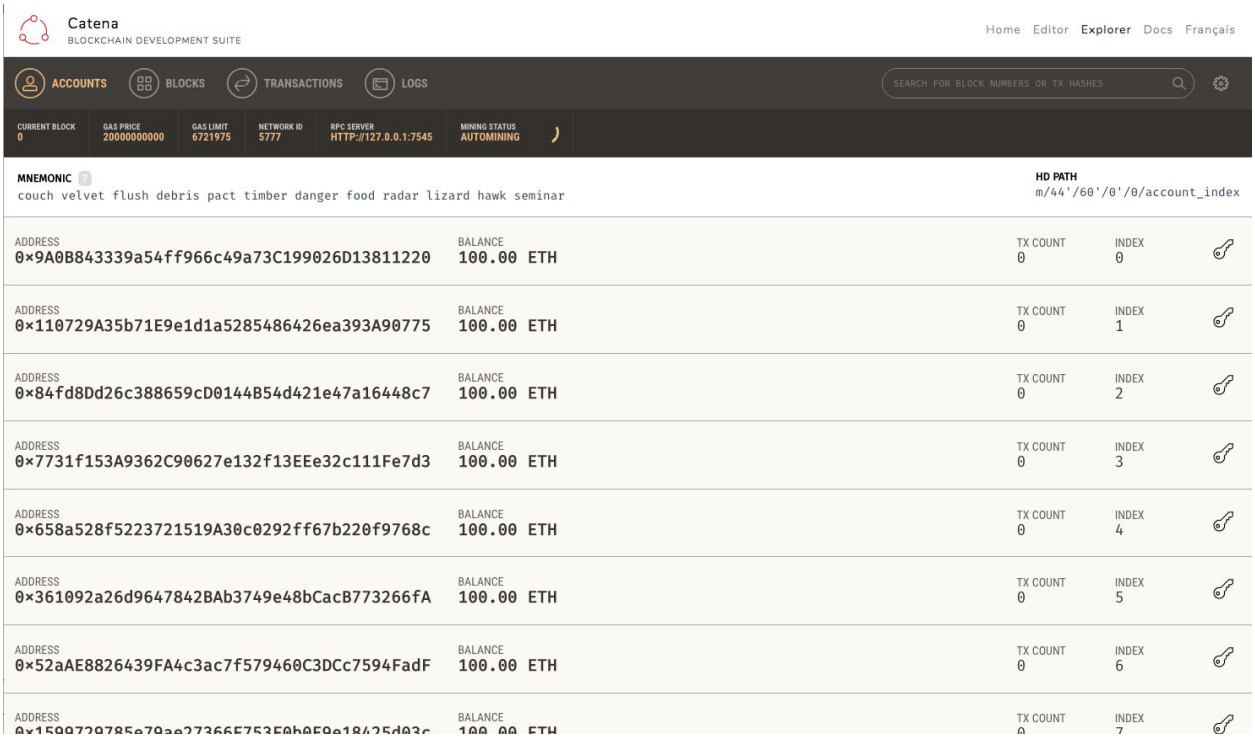
Solidity is statically typed, supports inheritance, libraries and complex user-defined types among other features.

Further documentation: http://solidity.readthedocs.io/

Ganache

Ganache is your personal blockchain for Ethereum development.

When you launch Ganache, the screen will show some details about the server, and also list out a number of accounts. Each account is given 100 ether. Having ether automatically in all accounts allows you to focus on developing your application.



There are four pages available:

- The **Accounts** page shows the accounts generated and their balances. This is the default view.
- The **Blocks** page shows each block as mined on the blockchain, along with gas used and transactions.
- The **Transactions** page lists all transactions run against the blockchain.
- The **Logs** page shows the logs for the server, which is useful for debugging.

Also note that you can search for block numbers or transaction hashes from a search box at the top.

Further documentation: http://truffleframework.com/docs/ganache/using

Truffle

Truffle is a development environment, testing framework and asset pipeline for Ethereum, aiming to make life as an Ethereum developer easier. With Truffle, you get:

- Built-in smart contract compilation, linking, deployment and binary management.
- Automated contract testing with Mocha and Chai.
- Configurable build pipeline with support for custom build processes.
- Scriptable deployment & migrations framework.
- Network management for deploying to many public & private networks.
- Interactive console for direct contract communication.
- Instant rebuilding of assets during development.
- External script runner that executes scripts within a Truffle environment.

Truffle is a command line tool, it has no web interface. In order to use it you must connect to your VM using ssh.

Further documentation: http://truffleframework.com/docs/