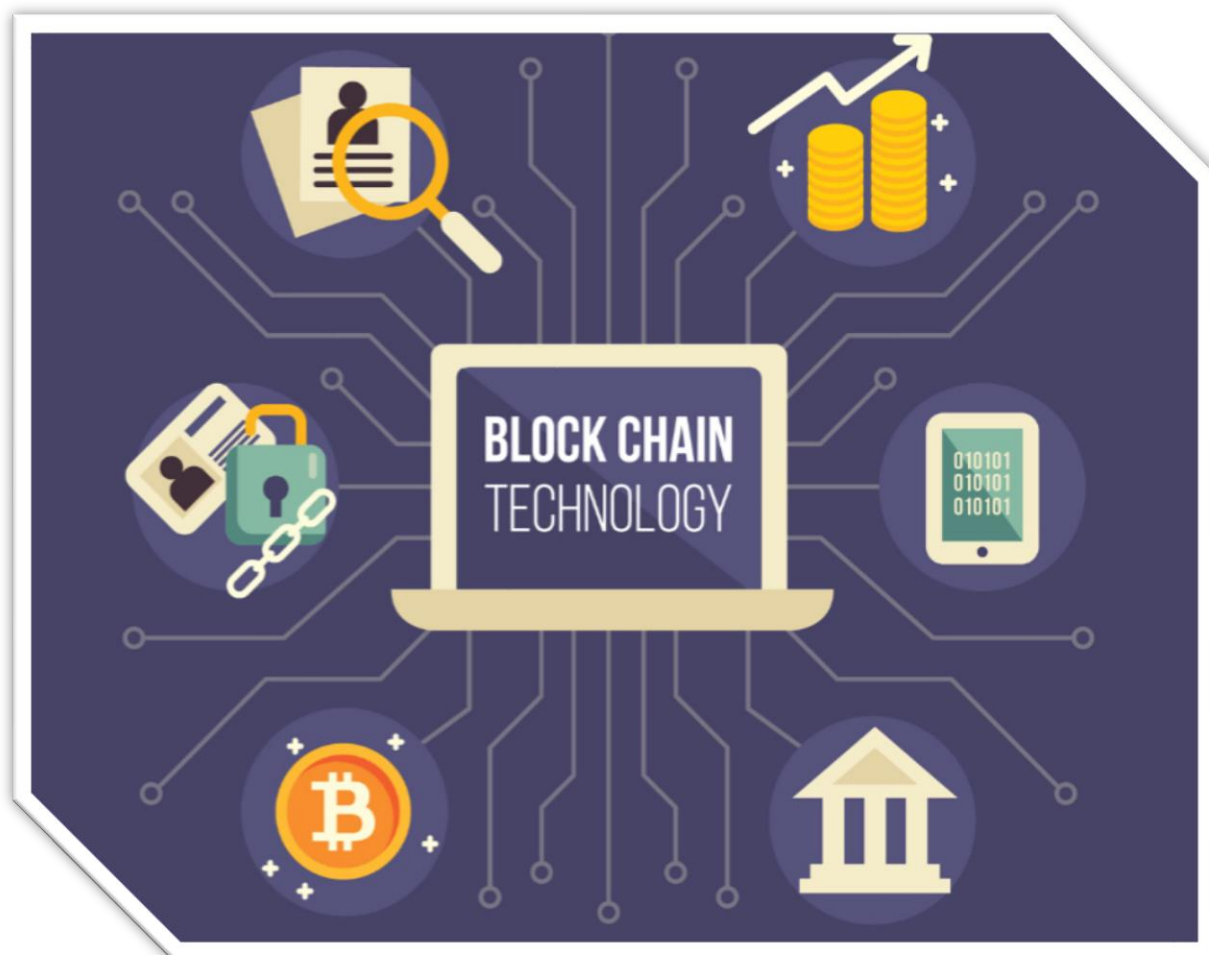


Blockchain Development Technologies



Genesis Convergence

<http://www.genesisconvergence.com>

+1 4242530744

info@cognitiveconvergence.com

Genesis Convergence offers blockchain consulting services to harness the potential of blockchain and gain valuable insights on DeFi (decentralized finance), NFTs, Web3, and Metaverse.

We provide cryptocurrency, cryptocurrency wallet, cryptocurrency exchange, tokenization of assets, NFTs marketplace development services.



Contents

OBJECTIVE	1
BLOCKCHAIN MODIFIES THE WAY INFORMATION IS SHARED	1
<i>Blockchain functioning</i>	1
FAMOUS TOOLS AND TECHNOLOGIES IN BLOCKCHAIN	2
1. <i>Solidity - A Programming Language for Ethereum</i>	2
2. <i>Solc - An Ethereum Script Compiler</i>	2
3. <i>Truffle - Ethereum Development Framework</i>	3
4. <i>Ganache - Personal Blockchain for Testing</i>	3
5. <i>Drizzle - Front End Libraries for Blockchain Developers</i>	3
6. <i>Geth - An Ethereum Client</i>	4
7. <i>Metamask - An Ethereum Wallet</i>	4
8. <i>dApp Board - Blockchain Explorer</i>	5
9. <i>Blockchain-as-a-Service (BaaS)</i>	5
10. <i>Ethlint (formerly Solium) - Solidity Code Linter</i>	5
11. <i>Remix IDE - Browser-Based Development Environment</i>	6
12. <i>Infura API - Ethereum Network Access API</i>	6
13. <i>Blockchain Testnets</i>	6
14. <i>Web3j</i>	7
15. <i>Prysm</i>	7
CONCLUSION	8



OBJECTIVE

These key pillars of blockchain technology lay the foundation for its uses throughout different industries, including in education. It has the potential to create a global environment where learning materials, publications, student credits, and transcripts are easily accessible. It can also introduce new and innovative ways for accountability, incentivization, and communication between teachers, students, and other participants.

BLOCKCHAIN MODIFIES THE WAY INFORMATION IS SHARED

In simple terms, a blockchain is a peer-to-peer distributed ledger that stores information and keeps track of transactions.

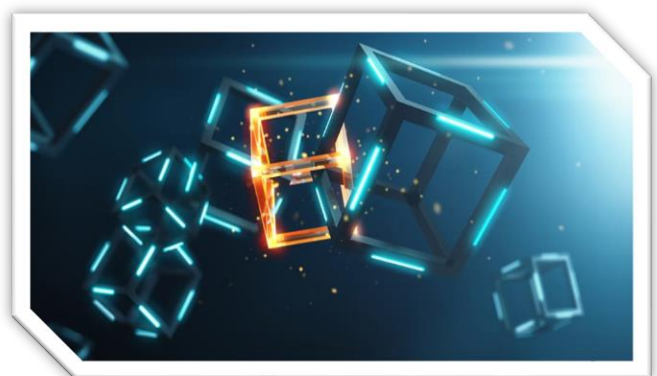
- Every member of the blockchain community has its own copy of the information.
- The information is recorded subsequently into units called blocks and protected by strong cryptography, creating a chain of data.
- Changes to blocks are not permitted by the blockchain system architecture, so every action and event could be traced to its origins.
- A blockchain could store data on agreements between the parties, their credentials, transactions, and any other information presented in a digital form.
- Since this information is distributed and highly secured, any attempt at a fraudulent activity can be seen by the members of the blockchain community.
- This creates trust and transparency for any type of ecosystem that the blockchain is integrated into.



Blockchain functioning

Blockchain is a platform that ensures the integrity of the information stored and maintains interactions between the members of the ecosystem. Here's a high-level overview of the way it works:

- Each member maintains their own blockchain node with the full history of all the events and data appended to the network, including credentials, identities, certificates, etc.
- Every update to the network entails the creation of a new block at the end of the chain. A blockchain protocol dictates how these blocks are recorded, validated, and distributed.
- A consensus mechanism is employed to verify each created block where members of the blockchain network decide if it's valid to be added to the chain.
- Once a block is created and confirmed, it cannot be revoked. All entries on the blockchain are permanent and securely stored. This allows for members of the community to trace the full history of transactions and any other modifications in the blockchain.



- Smart contracts are a special type of agreement between the members of the network that have the conditions programmed into them, making sure that they are met before each party receives what was agreed upon. Smart contracts eliminate the need for third parties and middlemen to be involved in agreement resolution.
- Transactions in cryptocurrency play a very important part in the blockchain ecosystem, providing the incentive for all members of the community to make valuable contributions and participate in the development of the system as a whole.

FAMOUS TOOLS AND TECHNOLOGIES IN BLOCKCHAIN

1. Solidity - A Programming Language for Ethereum

- Solidity is a programming language used by blockchain developers.
- It's one of the more popular programming languages used by developers because it works on the Ethereum Virtual Machine.
- C++, Python, and JavaScript are some languages that influenced Solidity, which is used to write smart contracts for Ethereum dApps.
- The reason we like it so much is that it doesn't just work on the Ethereum Virtual Machine, but is designed with it in mind.
- It's a relatively young language that is constantly evolving and the team behind its development releases a new minor version every two weeks, and two major releases every year.
- Users like Laracle's team of blockchain developers are also encouraged to help with the development so that Solidity grows to suit our needs.



2. Solc - An Ethereum Script Compiler

- Solc is a command-line compiler used to convert Solidity scripts into a readable format for the Ethereum Virtual Machine.
- Solc can create various outputs, including running simple binaries or estimating gas fees required to run a smart contract on the Ethereum Virtual Machine.
- There are two types of Solidity compilers, Solc and Solc-js. Solc is coded in C++, and Solc-js is cross-compiled in C++ to Javascript. Solc-js is slower than Solc, however, it enables platforms like Remix and Pragma to function.



3. Truffle - Ethereum Development Framework

- Truffle is a development environment and testing framework for Ethereum-based decentralized applications.
- It's a blockchain framework that comes with a vast library of custom deployments for writing smart contracts and other aspects of blockchain development.
- With Truffle, we can inject smart contracts into web apps and develop front-end dApps as well. Truffle's testing framework can run automated tests written in Javascript, Typescript, and Solidity.



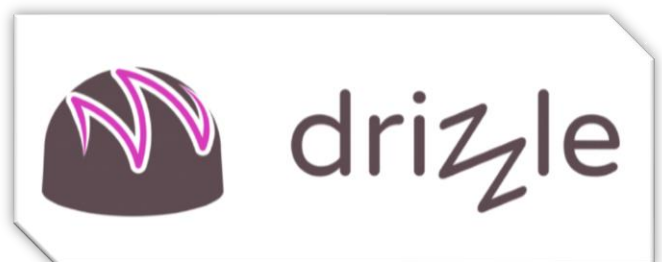
4. Ganache - Personal Blockchain for Testing

- We cannot edit smart contracts once they go live on Ethereum. Hence, developers carefully test their apps using programs like Ganache from the Truffle Suite of blockchain development tools.
- Ganache is a local memory blockchain used for development and testing.
- The Ethereum blockchain created using Ganache simulates all the features and adds accounts with test Ether tokens.
- One of Ganache's key features is that we can get all the benefits of testing your dApp on the main Ethereum chain without incurring gas fees.
- Ganache allows us to take full control of the test blockchain we create with tools like the block explorer, advanced mining controls, and blockchain log.



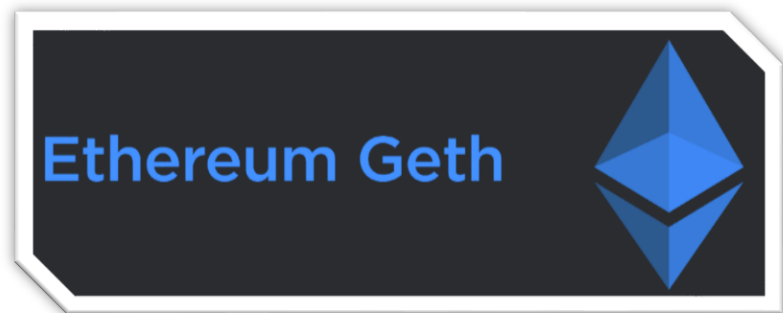
5. Drizzle - Front End Libraries for Blockchain Developers

- Drizzle is another tool from the Truffle Suite. Where Truffle works for development and Ganache for testing, Drizzle offers a collection of front-end libraries for developers.
- At the core of Drizzle is an Ethereum data store based on the popular React framework, Redux, that synchronizes on-chain contract and transactional data.
- Using Drizzle we can build user interfaces that behave predictably in highly asynchronous and non-deterministic environments.



6. Geth - An Ethereum Client

- For us to access the Ethereum blockchain, we use applications called clients. Geth, or go-ethereum, is the most popular Ethereum client in use.
- It's an open-source project that has been running Ethereum's public networks, Mainnet and testnet Rinkeby, for several years.
- We use Geth for blockchain development, transferring tokens, creating ether, writing smart contracts, and exporting block history.
- Geth has three interfaces that we use for blockchain development, a JSON-RPC server, an interactive console, and a command line.
- Although it comes with built-in access to testnet Rinkeby, it also allows users to network a local cluster of nodes to create their own Ethereum network.



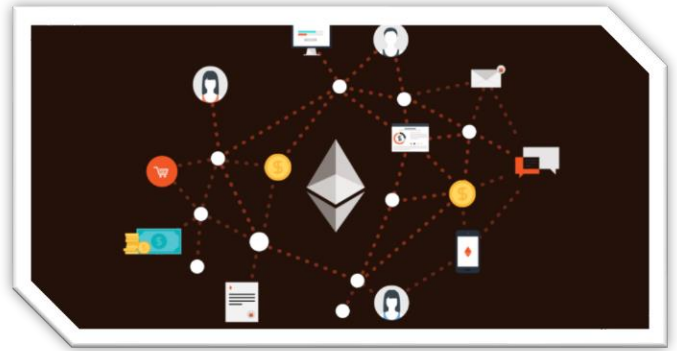
7. Metamask - An Ethereum Wallet

- Metamask is an Ethereum wallet accessible through a browser extension and mobile application.
- Ethereum users typically use Metamask to buy and sell ERC-20 and ETH tokens and consequently interact securely with Ethereum based dApps.
- However, developers can also use Metamask to work on dApps right within their browser.
- Metamask injects web3.js, a JavaScript library, into the namespaces of pages loaded by your browser. web3.js adds functionality that regular web2 websites can use to interact with the blockchain.
- Before Metamask, developers could only work on Ethereum dApps by running a full Ethereum node.



8. dApp Board - Blockchain Explorer

- dApp Board provides a visual representation and analysis of how decentralized applications are being used.
- With it, developers can get a 360-degree view of the Ethereum ecosystem and collect data on dApps, protocols, and tokens.
- Information about how services provided by existing smart contracts and applications can help developers improve the functionality of their own projects before they go live.



9. Blockchain-as-a-Service (BaaS)

- It can be impractical for small companies and entrepreneurs to implement a full end-to-end blockchain solution. BaaS (Blockchain-as-a-Service) bears similarities to SaaS and lets users reduce the operational overheads and technical complexities that come with blockchain implementation.
- BaaS lets you leverage cloud-based solutions to build, host, and use decentralized apps, smart contracts, and other blockchain-based functionality.
- The service providers handle and manage the tasks required to keep the Blockchain functioning and maintained. Some BaaS providers are Microsoft Azure, IBM Blockchain Platform, Kaleido, Facrom Harmony, and Dragonchain.



10. Ethlint (formerly Solium) - Solidity Code Linter

- Just as testing is an important step in dApp development, so is checking the code. Ethlint was initially designed to follow the Solidity style guide.
- However, with time it is now a customizable tool focused on the style and security of smart contracts.
- Before deploying a dApp developers need to make sure that their code is free from security holes.
- Ethlint formats and checks Solidity code for vulnerabilities and code style issues that might render a dApp useless.



11. Remix IDE - Browser-Based Development Environment

- Remix IDE is a browser-based solution that allows developers to write smart contracts in Solidity and Vyper.
- Remix fosters faster development and implementation.
- Its intuitive GUIs make it great as a playground for learning and teaching Ethereum.
- Some of the default modules used to test, debug and deploy smart contracts in Remix are File Explorer, Plugin Manager, Solidity Editor, and Terminal.
- Also of note when working with Remix IDE is that it debugs your code as you write it.
- Remix IDE runs on most modern browsers and can also run while offline.



12. Infura API - Ethereum Network Access API

- Infura is another API like web3.js that supports JSON-RPC over HTTPS and WebSocket with instant access up to 20 times faster than other available services.
- 60% of the Ethereum-based applications in circulation use Infura API making it the most popular way developers connect their decentralized apps to the Ethereum blockchain.
- It also comes with an intuitive dashboard with analytics on bandwidth usage, top method calls, most active times, etc.



13. Blockchain Testnets

- Blockchain Testnets are crucial to the development of dApps.
- Testnets are where developers run their dApps before we make them live on the blockchain.
- Each blockchain has a unique Testnet and developers use the respective Testnet for optimal results. As mentioned with Ganache.
- Testnets allow users to debug their dApps without incurring costs such as Ethereum's gas fees.



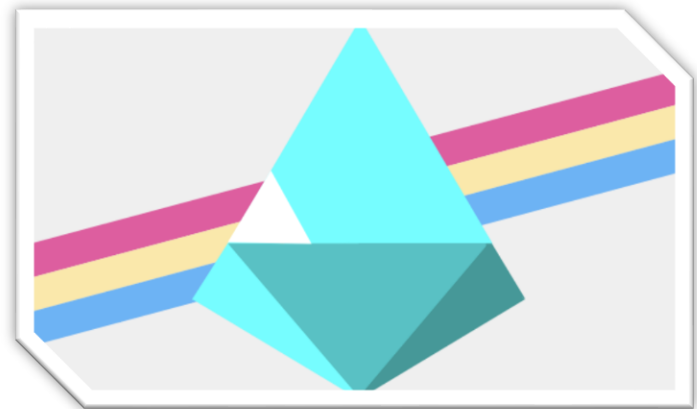
14. Web3j

- Web3j is a tool created for blockchain by the developers of Java WebSocket API. This helpful library lets developers connect and interact with Ethereum-based decentralized apps (dApps) based on blockchain.
- Additionally, it supports Generic JSON RPC spec for connecting to either a local or remote Ethereum node.
- The benefit of this software is that you don't need to set up different programming languages or infrastructure to interact with these transactions.
- Also, you don't require an understanding of how consensus works or whether miners are interfacing with these contracts. If you're able to code, you're set to go!



15. Prysm

- Prysm can be described as a tool designed for developers to help develop decentralized apps.
- It also provides a comprehensive guide to building your first decentralized app so that you can start now—a fully-featured client for the Ethereum 2.0 protocol written in Go.
- The Prysm project is a Go-based version of the Ethereum 2.0 protocol defined in their official protocol.
- It comes with a complete beacon node and serves as a validator client that allows being a part of blockchain consensus.
- Prysm makes use of the top-of-the-line instruments for the production server as well as interprocess communication.
- It uses Google's gRPC libraries, BoltDB, to provide an efficient, permanent key-value storage, key-value stores, and the libp2p library from Protocol Labs for all peer-to-peer networking.
- Prysm maintains two permanent branches:
 - **master:** This is the most recent stable version. It's ideal for most users.
 - **develop:** This branch is intended for development and includes the most recent PRs. Developers must base their PRs on this branch.



CONCLUSION

So, that's our list of Blockchain Tools/Blockchain Software every budding Blockchain Developer should experiment with. The Blockchain platform is relatively new, and hence, if you are ever-curious to try out new tools and acquire new Blockchain skills, you are guaranteed to have a promising career in Blockchain.

Contact Us

Genesis Convergence

<http://www.genesisconvergence.com>

+1 4242530744

info@cognitiveconvergence.com

info@cognitiveconvergence.com

+1 4242530744

<http://www.genesisconvergence.com>

