

ETHEREUM ESSENTIALS



WHY ETHEREUM?

Ethereum is now being considered a 'part of the internet' by leading figures like John Whelan (Head of Digital Investment Banking at Banco Santander, Chairman of the Ethereum Enterprise Alliance).

This statement inspired us to create an easy to read, helpful article to detail the essential knowledge needed when starting out in Blockchain and Ethereum.

All of the fundamentals will be covered in this ebook. It's a great place to start if you are new to Blockchain or as a handy reference document for the more seasoned developer!

WHAT IS BLOCKCHAIN?

Blockchain, is a growing list of records, called blocks, that are linked using cryptography. It is a distributed ledger, which means that a ledger is spread across the network among all peers in the network, and each peer holds a copy of the complete ledger.

No central authority is in control of the ledger, it is updated via consensus, giving it the power of decentralization.

WHAT IS THE DIFFERENCE BETWEEN PUBLIC AND PRIVATE BLOCKCHAIN NETWORKS?

The difference between public and private blockchain relates to who is allowed to participate in the network, execute the consensus protocol and maintain the shared ledger.

A public network is completely open, anyone can join and participate.

A private network requires an invitation which must be validated by the network starter or by a set of rules put in place by the network starter.

WHAT IS DLT VS BLOCKCHAIN?

Distributed Ledger Technology (DLT) is an umbrella term used to describe a database of records which store, distribute and facilitate the exchange of value between users, either privately or publicly. Blockchain is a type of DLT with very specific technological features.

WHAT IS A DAPP?

A decentralized application (DApp) is similar to a traditional app and could be considered as a 'blockchain enabled' website. It is not owned or controlled by a single entity and it connects to a blockchain via a smart contract.

You can think of a DApp like this:

App → Smart Contract → Blockchain

WHAT IS A DAO?

A DAO (decentralized autonomous organization) is one or more contracts, possibly funded by a group of like-minded individuals.

A DAO operates in a transparent way, independent of any human intervention, including its original creators.

A DAO will stay on the network as long as it covers its costs and is providing a useful service.

WHAT IS ETHEREUM?

Ethereum is a leading blockchain - a global open source platform based on blockchain tech that allows devs to create decentralized applications (DApps), write code to control a variety of transactions and build DAOs (decentralized autonomous organization).

Ethereum can store complex information and run smart contracts, much more than a simple record of currency transactions.

HOW DOES ETHEREUM WORK?


At the heart of Ethereum is the Ethereum Virtual Machine (EVM), a Turing complete software running on the Ethereum network which provides an executable and trustless environment for smart contracts.

Enabling the development of thousands of different applications all on one platform, means the EVM makes creating blockchain applications much easier and more efficient.

WHAT IS AN ETHEREUM SMART CONTRACT?

An Ethereum smart contract is a program that facilitates the exchange of money, content, property, shares, or anything of value. Running on the blockchain, they prevent the possibility of censorship, downtime, fraud or third-party interference.

A contract is comprised of code (methods) and data (state) located at a specific address on the Ethereum blockchain.



“ [The Ethereum] blockchain has some extraordinary capabilities. One of them is that you can build smart contracts. It’s kind of what it sounds like. It’s a contract that self-executes, and the contract handles the enforcement, the management, performance, and payment”
Don Tapscott

WHAT PROGRAMMING LANGUAGES ARE USED FOR WRITING SMART CONTRACTS?

The primary language is Solidity, which was developed by Ethereum’s core contributors to facilitate the development of smart contracts functioning on Ethereum. It was designed to target the Ethereum Virtual Machine (EVM). However, there are others like Vyper and LLL.

HOW CAN I DEVELOP A DAPP AND ACCESS ETHEREUM?

There are several ways you can plug into the Ethereum network, one way is to use the MetaMask browser extension. This turns Google Chrome into an Ethereum browser. It allows anyone to easily run or develop Dapps from their browser.

Another option is via the [Sirato Blockchain Explorer](#) which enables you to create and deploy your first live smart contract on a public Ethereum network in 3 commands!

WHAT ARE TRANSACTIONS?

A transaction makes changes to the stored information in the blockchain. In Ethereum this can involve tokens changing owners or changing the information that's stored about a token without changing its owner. In Ethereum's main chain, all transactions that occur have a cost that is paid in the Ether cryptocurrency.

WHAT IS AN ETHEREUM BLOCK?

A block of transactions that have been broadcast to the network are called A “block”. The Proof of Work consensus algorithm is used by the Ethereum public network (known as “mainnet”) to validate blocks of transactions.

WHAT IS ETHER (ETH)?

Ether is Ethereum’s native token and the fuel that powers the Ethereum blockchain. On Ethereum, each transaction needs to be ‘mined’. This takes computing energy to perform.

To compensate miners/ network users for the work spent on running transactions and smart contracts, a unit of measurement was created.

HOW CAN I EARN ETHER (ETH)?

There are many ways to earn ETH. Mining Ethereum and supporting the network is one way to be paid in ETH but it is also becoming popular as a way to pay freelancers - a good place to look is The Bounties Network (<https://www.bounties.network/>). If you're looking to buy ETH, it is available on most cryptocurrency exchanges.

WHAT IS GAS?

Gas is a unit of measurement that is unique to the Ethereum blockchain and measures the computation required to run transactions or smart contracts within the EVM. When you request a transaction to take place, you'll name the gas price that you're willing to pay for the transaction to be mined. The value of each unit of gas is expressed in ether.

The Eth Gas Station (<https://ethgasstation.info/>) is a great source for obtaining recommended gas prices.

WHAT IS THE GAS LIMIT IN ETHEREUM?

A gas limit is the maximum amount of 'fuel' you're willing to use for a transaction. Gas limits protect users and miners from faulty codes and network attacks. Different amounts of gas will be needed depending on how much energy is required to perform the transaction.

WHAT IS AN ETHEREUM ADDRESS?

To send and receive funds, cryptocurrencies require addresses, or public identifiers. An Ethereum address is unique to Ethereum's Ether currency. In order for a transaction to take place, it must be signed by an Ethereum address, using the addressee's private key. This verifies that the transaction was carried out by that address.

WHAT IS ENS?

ENS is the Ethereum Name Service (<https://ens.domains/>) and it's similar to the Internet's Domain Name Service. Both offer a way of making addresses more human friendly, translating human-readable names into their underlying representations — computer addresses. They operate on a system of domains (dot-separated hierarchical names). The owner of a domain has full control over subdomains.

You can ultimately map an ENS name to anything but there are standards for mapping to (a) any cryptocurrency address (not just ETH addresses), (b) IPFS/Swarm hashes for decentralized websites, (c) Tor .onion addresses, (d) text records.

While .ETH is an ENS-native TLD, work has already begun on integrating the DNS namespace for use on ENS, e.g. with .XYZ, .LUXE, .KRED, etc. Soon, there are plans to roll this out to most of the rest of the DNS namespace.

WHAT IS A COINBASE ADDRESS?

Not to be confused with the company Coinbase - in order to mine, miners must set up a “coinbase” - a fixed address where the earnings from mining are credited.

WHAT IS AN ETHEREUM WALLET?

Ethereum wallets hold various tokens including ether. Each wallet has a public key (the hash is the address used to verify transactions) and a private key (used to sign transactions and for authentication).

There are different cryptocurrency wallet types and it's important to invest time and effort into choosing the right one as it's an important investment decision.

WHAT DIFFERENT TYPES OF CRYPTOCURRENCY WALLETS ARE THERE?

There are five types of digital storage available for your use:

- Online - run on the cloud, choose carefully as they have an extensive scam history
- Mobile - mobile phone applications, simply install and open an account
- Desktop - downloaded and installed on a pc or laptop
- Hardware - most expensive but considered one of the safest, private keys are stored on a device, normally a usb drive
- Paper wallets - the safest option for your digital assets, a physical copy of your generated public and private keys

WHAT IS AN ETHEREUM TOKEN?

Ethereum enables users to create smart contracts, some of them represent digital assets called Ethereum tokens. Tokens can be created by anyone and they can represent anything, currency, cryptocurrency or physical objects. Token creators exchange tokens for Ether or other digital currencies.



WHAT IS EIP?

Ethereum Improvement Proposal (EIP) is a design document that provides information, describes a new feature for Ethereum or its processes or environment. It should include concise technical spec. of the feature and a rationale. There are a number of types of EIPs, and each has its own list of EIPs. You can find the full list here <https://eips.ethereum.org/>

WHAT IS ERC?

Ethereum Request for Comments (ERC) are standards used for smart contract standards. Your contract must meet the required criteria to be considered compatible. Standards such as ERC20 and ERC721 allow a wallet service to interact with an abundance of tokens and trade with token contracts. The full list is maintained at <https://eips.ethereum.org/>

WHAT ARE FUNGIBLE TOKENS?

Fungibility describes a good or commodity whose individual units are identical and interchangeable, money and cryptocurrencies are fungible. ERC20 is the most accepted standard for fungible tokens, there are 6 key functions and 2 events that must be met to meet the standard.

The functions apply to how tokens can be transferred (by its owner/ on behalf of its owner) and how to access data about the token (name, symbol, total supply, and account balance).

The two events are transfers and approvals, and how they need to be formatted.

WHAT ARE NON-FUNGIBLE TOKENS?

Non-fungible tokens (NFTs) represent items with unique differences, think of artwork or precious gems! A well known example of NFTs is CryptoKitties. ERC721 is the most accepted standard for NFTs, and no two are alike.

HOW CAN I KEEP TRACK OF MY TRANSACTIONS AND SMART CONTRACTS?

This all depends which blockchain network you are using.

If you want to understand the activities that are taking place on blockchain networks, your go-to tool should be the block explorer.

We encourage you to try the [Sirato Block Explorer](#).

A [public-facing instance of it is available](#) which you can try out. This is connected to the Goerli testnet, which is a public Ethereum test network.

WHAT IS THE ENTERPRISE ETHEREUM ALLIANCE?

The Enterprise Ethereum Alliance <https://entethalliance.org/> (EEA) is a member-led industry organization providing global standards for Enterprise Ethereum development. It aims to empower enterprises by driving the use of Ethereum blockchain technology.

The EEA Client Specification (<https://entethalliance.github.io/client-spec/spec.html>) is one such standard it's responsible for.

It's also driving the Token Taxonomy Initiative (<https://tokentaxonomy.org/>) to help standardise token behaviours and use cases spanning multiple industry verticals as well as DLTs (Distributed Ledger Technology).

WHAT IS WEB3 LABS?

Web3 Labs works with organisations to define and execute their Web3 strategy. Its clients include Microsoft, J.P. Morgan and Vodafone.

It also works with leading blockchain companies and protocols to develop their ecosystems and platforms. The organisations Web3 Labs has worked with include ConsenSys, R3, the Ethereum Foundation and ICON.

- **Production Support for Blockchain Networks**

We provide SLA-backed production support for Ethereum networks running Quorum and Hyperledger Besu.

web3labs.com/enterprise-blockchain-support

- **Strategy and Delivery Services**

From PoCs to MVPs, we can ensure you're prepared for blockchain and DLT technology.

web3labs.com/blockchain-strategy-delivery

- **Sirato Blockchain Explorer**

Provides all of the business metrics you need to support your blockchain and smart contract applications.

web3labs.com/sirato

Ethereum Essentials by

