

2.2.2.3.1.1 Ledger

return to Immutable Data Objects

Typically, an [immutable data object](#) is stored as a [ledger](#). The term *ledger* is a distributed [object](#) that has its root within accounting systems and is comprised of a series of entries that represent an account at different stages in its life. This includes its value, an operation to be performed on the value, and potentially another account that receives or sends an amount. Ledger entries are immutable, i.e., once an entry has been added to the ledger, it can never be modified. New versions of the entry exist, and transactions capture the changes required to move between the data entry values.

For example, if the original value for an entry was AAAA and a transaction wants to modify the value to BBBB, the original value remains in the ledger and a new entry is made with the value BBBB. The new entry points back to the previous value that contained AAAA. Thus, by following the chain of modifications backwards, the [provenance](#) and ultimately the [pedigree](#) of the value can be determined.

The ledger is not limited to account numbers but can have general identifiers which represent [fungible](#) data. For example, a library has books, but the books are referenced by an [identifier](#), not an account. Patrons of the library may have identifiers which might look like accounts, but simply identify the patron.

The ledger exists at all nodes within the network. In the [blockchain](#) implementations of DIDO, all the values in the ledger for a particular [entity](#) will be identical when all the outstanding transactions contained within a block have been validated and verified and properly distributed throughout the network. There are alternatives to blocks and blockchains. For example, Hashgraphs which have been proven to also solve the Byzantine general problem asynchronously without having to use expensive Bitcoin PoW algorithms. ¹⁾

¹⁾

G. Kingsly, "Hashgraph vs. Blockchain Is the end of [Bitcoin](#) and Ethereum near?," coindocex, January 2018.

<https://coindocex.com/article/1151/hashgraph-vs-blockchain-is-the-end-of-bitcoin-and-ethereum-near/>.

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