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IOTA

A blockchain is structured in a linear fashion, where nodes compete for putting their proposed block as an extension of this structure. This competition leads to some or more bottlenecks especially in terms of consensus. This is caused by the succeeding block having to be propagated to the whole network such that all the nodes can update their ledger and strive for achieving the same worldview. Direct acrylic graph (DAG) is a data structure that is designed to counter this consensus bottleneck, and possibly enable multiple transactions processed simultaneously (Blog.iota.org). In the IOTA project, this graph is called the *tangle.* The architecture of the DAG is composed by a transaction connected to each other by arrows. DAG abandon the linear structure of data; instead, its concept entails that a new transaction must approve to earlier transactions to be applied to the graph. After the approval of two earlier transactions, the new transaction is left unapproved and becomes a tip of the graph. When another transaction is posted to the DAG, this transaction will then seek to approve the earlier transaction and another neighbor tip transaction. What transactions are chosen by the algorithm to be approved, is based on the parameters of *height*, *weight,* and *depth* of the transaction, and depends on the transaction's topology and number ancestor transactions.

For the nodes to validate the transaction, they must complete a cryptographic puzzle, similar to that of bitcoin that entails computing a hash on some unroyally random nonce, where the outcome has to be of a specific from. The nodes are not rewarded anything from the validation though. The nodes are incentivized to propagate transactions by the policy that nodes will tend to omit propagation to "lazy" nodes if there has been radio silence for a while (as nodes intermittently communicate "receipts" of relayed transactions with one another) (Popov 2020). The algorithm that has been described in short on this page, is essentially the algorithm of the IOTA project.

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References:

Blog.iota.org, Research and development (Jan 2018), The tangle: an illustrated solution, accessed 5.4.2020. link

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