Cryptocurrencies, Blockchain & Consensus Report

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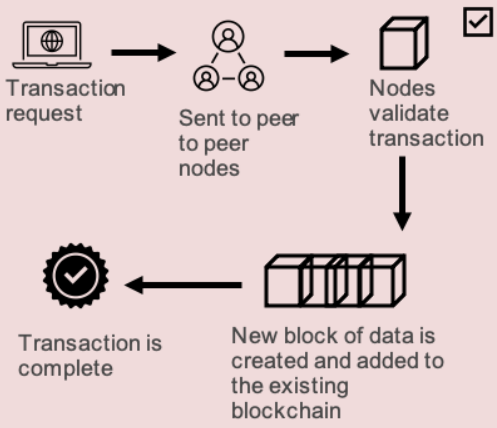
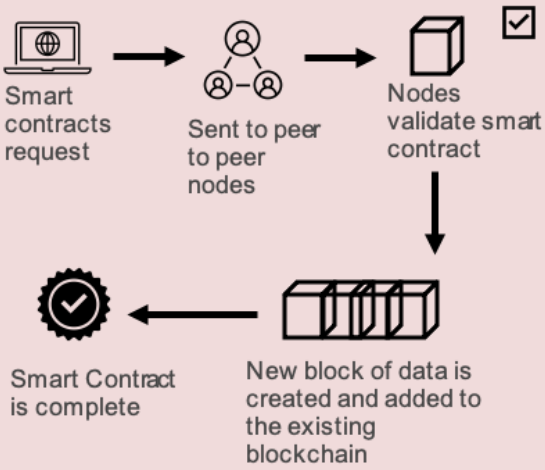
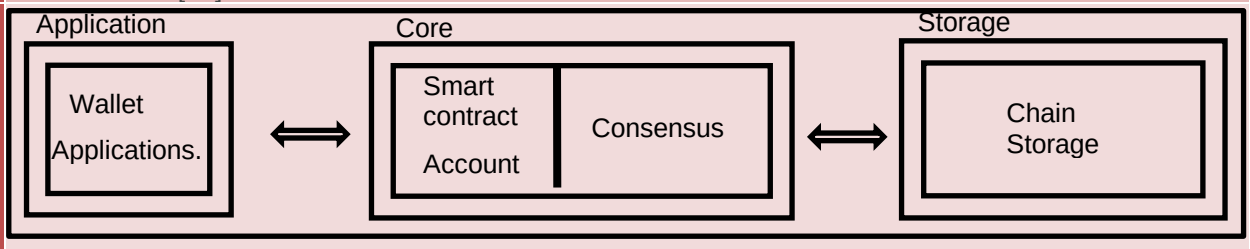
	Bitcoin	Ethereum
Underlying Technology - Blockchain	A blockchain is a digital database of transactions. The name is derived from the structure itself where a blockchain records information in groups known as 'blocks' that store sets of information. Blocks have a limited storage capacity and once filled, they are linked via a chain to a previously filled block, resulting in a chain of data known as a 'blockchain'. This technology also creates a timeline of data so that each block in the chain has an exact timestamp once added to the chain.[1] The transactions are recorded across a network of computers so that blocks can't be altered without altering all subsequent blocks. This network of computers maintains and validates a record of transactions through a cryptographic trail. These records are decentralised, meaning they are not maintained by a single authority such as the case in banks. In the blockchain system, the computers within the network act as 'nodes'. These 'nodes' verify transactions using agreed-upon algorithms. This method is known as the consensus mechanism. Bitcoin uses a 'proof-of-work'[1] algorithm. This consensus mechanism is a mathematical mechanism meaning participants have to agree on the algorithm and the rules which will ultimately end in a record of a proposed transaction which has a digital trace and audit trail. Cryptocurrencies such as bitcoin use blockchain technology to record every bitcoin transaction ever made. [2] **Bottomline:** Bitcoin is essentially an online payment system, that operates as an alternative 'currency' form.	Ethereum also implements a blockchain technology system. However, it is much more than a payments system. Ethereum uses blockchain technology to deploy smart contracts and decentralized applications. These applications can run without any downtime and at low fraud risk. What is unique to Ethereum is that it also uses its own programming language in blockchain allowing developers to build and run applications which is different to bitcoin's implementation of blockchain. [3] Ethereum also operates a decentralized system similar to bitcoin in that no one single authority has audit and recording power. Ethereum also uses consensus mechanisms, specifically 'proof-of-work' to verify transactions and add new blocks to the blockchain using mathematical algorithms that have to be solved to be awarded cryptocurrency. In this case 'ether'. Ethereum has begun a change to a 'proof-of-stake' consensus mechanism in Ethereum is different from Bitcoin in that the network can perform computations as part of the mining process resulting in a global computing engine and database. [3] Main difference between blockchain used by bitcoin and Ethereum is that Ethereum transactions can contain executable code, whereas bitcoin blocks mainly contain transaction notes.[4] **Bottomline:** Ethereum is a platform to facilitate contracts and applications via its own currency.
Architecture	 [5]	
Strengths/ Weaknesses	**Strengths [6]** - Bitcoin is accessible 24/7, globally. - Decentralised system reduces security risk. - Bitcoin requires no permission to access it. - Transactions are low cost and quick (10 minutes). - Using consensus mechanisms mean transactions can't be blocked. - Bitcoin can't be confiscated.	**Strengths [4]** - Accessible 24/7, globally. - Decentralised system reduces security risk. - Allows both permissioned and permissionless transactions. - Transactions are and quick (12 seconds). - Ethereum offers ether, smart contracts and the Ethereum Virtual Machine. - Large developer community

	Weaknesses[6] - Price of bitcoin is volatile. - Bitcoin can be stolen by hackers. - Bitcoin market is not regulated, leaving you exposed to fraud or malpractice. - Slow speeds of 7 transactions per second.	**Weaknesses[4]** - Price of ether is volatile. - Unstable system from transitioning consensus mechanism to Proof-of-Stake. - Slow speeds of 15 transactions per second.
Trade-offs	Typically, a blockchain can only have two of these three properties: security, decentralization, and scalability. This is the blockchain trilemma. Scalability of the bitcoin network is limited by the average transaction creation time of 10 minutes and the block size limit of 1 megabyte. It operates a decentralised and secure system but is not scalable. [7] Proof-of-Work transactions also use up an extremely enormous amount of energy 110 Terrawatt hours per year.[8]	Scalability issues occur due to the relatively low transaction per second rate. Ethereum has security and decentralisation but lacks scalability. [9] Ethereum are transitioning to a upgraded system Ethereum 2.0 which will use Proof-of-Stake consensus mechanism to improve performance, increase speed and improve scalability.
Market Value	$1,046,894,039,795 [10]	$459,372,787,032 [10]

	Tron
Underlying Technology - Blockchain	Tron cryptocurrency operates a similar blockchain method to bitcoin. However, the application of Tron is different to bitcoin in that Tron aims to become a worldwide leader in free entertainment content storage and distribution. The platform allows free storage and ownership of content. [11] Tron essentially pays for participant content. Tron cryptocurrency is called TRX and each transaction can be linked to previous transactions on a public ledger, similar to bitcoin's blockchain method.[12] The only difference is that TRX uses a Proof-of-Stake general consensus mechanism and not Proof-of-Work which is used in bitcoin networks. TRON uses Delegated Proof-of-Stake where 27 elected Super Representatives have the authority to create blocks for the network. This allows TRON to achieve much faster rates of transactions. [13]
Architecture	 Tron blockchain has a three-layer architecture comprised of application, core and storage layers. Application layer is for building crypto-wallets and applications. Core layer is where smart contracts and accounts are stored. Storage layer consists of [14]
Strengths/ Weaknesses	**Strengths** - Aimed at lucrative entertainment industry. - Decentralised system allows content owners to publish and own their own content without any intermediaries. - Tron supports large applications and network can create 2000 transactions per second. - Network transactions are free of charge. - System is secure and low risk due to decentralised system. **Weaknesses** - Tron platform may be too centralised due to 50% of its TRX coins are stored in 10 addresses. - Only 15% of coins are open for private investment, meaning the rest are owned by large investors. - Tron is still relatively new and in the initial stages of development. [15]
Trade-offs	Typically, a blockchain can only have two of these three properties: security, decentralization, and scalability. Tron supporters believe Tron is best for security and scalability owing to its 2000 transaction per second rate as a result of implementing Proof-of-Stake consensus mechanism. The trade-off is reduced decentralisation due to the Delegated Proof-of-Stake where 27 elected Super Representatives have the authority to validate and secure the multi-million-dollar network. [16]
Market Value	$9,183,609,475 [10]

[1] Proof-of-Work: Works by incentivising people to create blocks using rewards funded via inflation where all holders of coin are taxed to execute transaction on the network. Proof-of-Work is based on an advanced form of mathematics which can only be done by computers. The more complex mathematics the more power is needed by the computer and so energy consumption is huge and cost is increased due to need for high powered computer. [17]

[2] Proof-of-Stake: Works by incentivising people to validate proposed blocks when chosen at random, so they are not competing with one another. People who validate proposed blocks get rewards. This significantly reduces energy consumption. [18]

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