Who Gets to Add a Block to the Cardano Blockchain?

With the underlined upcoming dawn of Shelley, Cardano - the first third-generation blockchain to emerge from a scientific philosophy - will become the world's first provably secure & decentralized Proof-of-Stake (PoS) blockchain. As a Proof-of-Stake blockchain, there are some fundamental differences between Cardano and other blockchain ecosystems. A key point of difference is how Cardano chooses who participates in adding blocks to the Cardano blockchain, thereby strengthening the overall security of the network. In this post, we will simply explain how staking in Cardano fairly and unbiasedly chooses the next ADA holder to add a block to the Cardano blockchain once Cardano becomes fully decentralized.

Cardano: A Fundamentally More Decentralized Approach

In a previous post, we compared Cardano and Bitcoin to two different kinds of supermarkets. Within the Bitcoin supermarket, the checkouts are the mining pools. Baskets of goods (or baskets of cryptocurrency transactions, known as blocks) are processed by the cashiers (miners) and are added to the blockchain if the transactions are all correctly validated. We ultimately saw that in the Bitcoin supermarket, there are a very few checkouts (mining pools) that process the majority of the baskets of goods (cryptocurrency

transactions that take place on the blockchain). This is because the size of the checkouts (mining pools) are proportional to the amount of energy these cashiers (miners) contribute towards keeping the Bitcoin blockchain running. Smaller, normal computers are very tiny checkouts, while bigger, industrial mining rigs are very large checkouts. Naturally, the giant checkouts have the biggest chance of getting to process a basket of goods and receive rewards.

However, within the Cardano ADA supermarket, the Cardano blockchain network with staking functionality can support many more checkouts (stake pools) that are each run by a cashier (stake pool operator) to process the baskets of goods (blocks) on the network. Effectively, staking is when an ADA holder participates by staking or delegating their ADA to the Cardano blockchain network. Cardano is designed to ensure each checkout reaches a maximum size to guarantee there cannot be many giant checkouts processing the majority of baskets.

Cardano & The Fairness of Randomness

Each time a basket of goods (a block of ADA transactions), needs to be added to the Cardano blockchain, one cashier and checkout (stake pool operator and stake pool respectively), needs to be selected. This selection is a lottery with ADA rewards attached. When regular Cardano holders contribute their ADA stake to a certain cashier, this cashier gets more lottery tickets. This means they have a greater chance to win the lottery. A smaller checkout with fewer lottery tickets would have lower chances of winning, while a bigger checkout with more tickets would have greater chances of winning.

However, what happens when there are one hundred checkouts, all equally identical in size with the same number of lottery tickets? If every cashier holds the same amount of lottery tickets, who wins and gets to process the next basket of ADA transactions? To achieve a fair lottery, Cardano adds a special element: randomness. Without randomness, some cashiers might get more basket of goods than others. The Cardano network achieves randomness to ensure a fair lottery. The cashier who wins the lottery is called the leader (slot leader).

Randomness is a major part of daily life. Avoiding a predictable pattern is key for Cardano to ensure fair and random lotteries in the long run. Randomness is achieved by the cashiers performing a set of actions that results in a verifiably random piece of information known as a seed. This seed is used in a function which elects a slot leader. This function selects one of the lottery tickets (ADA stake) that exist on the Cardano blockchain.

If the lottery ticket holder has delegated their ADA stake to a cashier (stake pool), the cashier is allowed to validate a block. This leader has the power to add the next block to the Cardano blockchain. The rewards for doing so are automatically distributed to the block validator and the owner of the stake. In this way, there is an equal chance for all checkouts of equal size to receive a random opportunity to add a block to the Cardano blockchain.

Conclusion

Cardano's Proof-of-Stake protocol requires active participation in order to be rewarded. This means that to be selected, certain processes need to run for a cashier (stake pool operator) to be selected to generate the next block. The ADA holder who is elected to validate the next block of transactions is done so through a fair lottery. Anyone from a group of ADA stakeholders can become a slot leader. The more ADA stake a stakeholder has, the greater chances they have to become a slot leader. However, for equal sized stake pools, there is an equal chance for those participating to add the next block to Cardano.

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EMURGO drives the adoption of Cardano and adds value to ADA holders by building, investing in, and advising projects or organizations that adopt Cardano's decentralized blockchain ecosystem. EMURGO leverages its expertise in blockchain R&D as well as its global network of related blockchain and industry partners to support ventures globally.

EMURGO is the official commercial and venture arm of the Cardano project, headquartered in Singapore, with a presence in Japan, the USA, India, and Indonesia. EMURGO works closely with IOHK and The Cardano Foundation to grow Cardano's ecosystem globally, and promote its adoption. Learn more about the project at https://emurgo.io

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