Introduction to PSG fragmentation solution

With the constantly-increasing transaction amount, scalability has turned into a serious barrier for blockchain evolution. How to enhance parallel processing capabilities has become an issue that every exchange platform must deal with. Recently, most projects respond to the scalability issue with several mechanisms such as cutting down the decentralization, expanding the block size, state channel, side chain, directed acyclic graph, and sharding. We, Penta team, as we honestly believe in a decentralized ecosystem, newly introduced a new PSG sharding technology to increase the transaction without lowering Penta's decentralization.

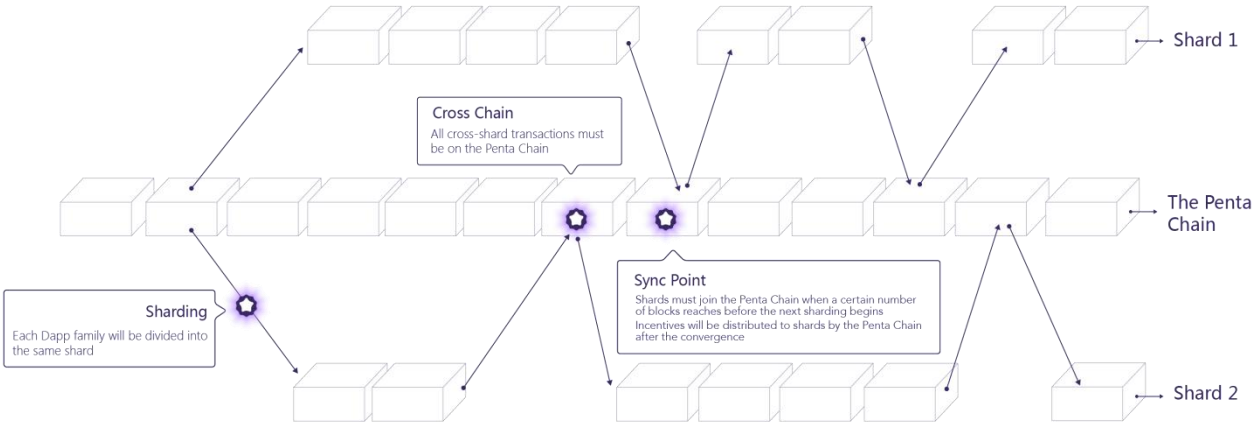
For several years, enterprises have been dealing with a massive increase in data volume and computing power. To adapt, two solutions are available: vertical scaling (increase the power of the machine) or horizontal scaling (increase the number of machine and redistribute the load). Let's see if it is applicable to blockchain and how it could be applied within Penta ecosystem.

What would it look in a blockchain network? Is it possible?

As for now, blockchain only acts as a single entity, as each node is handling all the transaction to independently reach consensus, neither vertical nor horizontal scaling is currently feasible. Adding more and more nodes does not enhance the throughput because the transactions are not processed in parallel. Having the possibility to process simultaneously a set of transactions would increase the throughput of the system.

In the blockchain space, people are generally talking about two types of sharding solution. One solution means to deal with the storage scalability, the other solution aims to solve the transaction scalability. We, Penta team, are concentrating our technology on the second solution to strengthen our transaction throughput.

Penta Sharding Graph, solution to solve scalability, latency and transaction throughput



Will Penta shard be secure, decentralized and efficient?

Efficiency

As I introduced previously, we embrace the transaction sharding method. By dynamically and randomly grouping nodes which are working to simultaneously deal with specific addresses range or DApp transactions. Penta Sharding Graph (PSG) will automatically readjust the number of shards to prevent unbalance load which could impact the smooth usage of the Penta chain. To fully benefit from load balancing, the transaction must be dispatched evenly among the shards. This partition is set at the shards level and relies on the address key. The protocol will set a value range each shard.

Consistency

The PSG sharding technology demands that once a particular quantity of block is reached, a Sync Point with Penta main chain is ordered. All the shards need to follow the DSC consensus, therefore avoiding a fork, and ensuring the consistency of the transactions, including smart contracts. The Sync Point is essential when it comes to a cross-shard transaction. I will explain more about this later.

Safety

PSG shards maintain the same security policy and governance structure as the Penta main chain, ensuring overall system security. As a shard will be formed of a shorter number of nodes, the risk of fraud/malicious attack is bigger. To ensure a reliable solution while working on a decentralized and democratic ecosystem, each shard needs to be generated randomly, without the possibility for a node to determine in which shard he will be assigned. A shard is by definition weaker than the main net. A method to ensure the high availability of each shard could be to randomly preselect a specific amount of nodes which have previously worked properly on the main chain, therefore insuring the accessibility of the entire shards.

Fairness

The PSG shards adopt the DSC consensus algorithm mechanism, in which the RSA random sorting algorithm provides impartiality. To make sure that we can run DSC consensus algorithm for each shard, we need to ensure that each shard is composed with delegates and witness. *(To learn more about our DSC feel free to read our white paper http://penta.global/)*

Cross-segmentation technology

In the PSG sharding technology, the synchronization point technology of the Penta main chain Sync Point is set to establish the compatibility of cross-shard transactions. The establishment of vouchers in the shard permits the transaction to take effect rapidly between different shards. When the shards are imported into the main chain, they will control and separate the processing of cross-segment transaction vouchers. For transactions that are not handled due to network or other reasons, the target transactions are prioritized and guaranteed. Cross-shard transaction credentials can be processed in a timely manner. The interaction between vouchers always guarantees the security of transactions between shards and main chains and across shards.

In Conclusion

The new PSG sharding technology we offer does not simply seek strong-scalability but again aim to secure the system's consistency, fairness, security, and availability. Just as the Penta chain uses the DSC consensus algorithm that balances efficiency with fairness, both of them follow Penta's universal values. From a technological point of view, we always deal with the performance, stability, impartiality, and availability, and strive to find a harmony position for endless growth and optimization. Through ingenious research and analysis, we continue to work hard to bring the Penta ecosystem.