HPP Platform White Paper

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HPP Platform : A General Purpose Decentralized High Performances Computing platform

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Abstract :

HPP (**H**igh **P**erformance Computing **P**latform) is a Distributed infrastructure for Heigh Performance Computing that can carry general purpose computing tasks on heterogeneous devices hosted by large number of distributed nodes considered as Smart properties[1], Nodes can join and leave the network without affecting the overall Network performances. A node (NODE) can sign a smart contract[2] to process computation on behalf of a tasks provider (PROVIDER) and earn fees paid in HPP (**H**igh **P**erformance Computing **P**latform Coin) upon completion of the contract terms.

1 Introduction :

The main motivation behind this work comes from the increased need of computing power in the academic research centers, academic institution in most countries cannot afford to have it's own HPC (**H**igh **P**erformance **C**omputing) infrastructure[3] nor the high cost of HPC cloud service providers. Hence the idea to connect all universities workstations, servers and even laptops and form a big decentralized datacenter.

The idea is indeed very interesting, and very promising, but a lot of problems should be addressed before we can come up with a scalable and distributed platform for general purpose high performances computing, problems that can be perceived from two different perspectives : economic and technical.

2 Economic perspective:

Computing power scarcity : The economic problem emerges because our computing power needs are greater than our ability to produce this computing power. HPP solve this problem using the concept "**Give** and **Take**". a research center in Denver can **Give** a part of its computing power from 06 PM MST to 08 AM MST and earn HPP coins and use them to **Take** control of higher computing power from 08 AM MST to 06 PM MST.

3 Technical perspective :

3-1 Distributivity : the block chain technology is highly distributed by design, NODES form a peer to peer network [4], communication is implemented in RPC[5].

3-2 Anonymity : HPP is built on top of bitcoin daemon[6], a NODE can activate Tor to benefit from high anonymity[7], a NODE can also anonymize the earned coins using the Zerocoin protocol [8].

3-3 Security : Node security is ensured through virtualization [9], PROVIDER data security is ensured by encrypting sensitive data and Virtual Host lifecycle control.

3-4 Scalability : Nodes automatic deployment, node migration, PROVIDER's data replication.

3-5 Availability : Proof of Uptime and resources availability are checked permanently by the block chain.

3-6 General Purpose Computing platform : use of open standards like : Xen virtualization, OpenSSH, OpenCL [10] and OpenMP [11].

3-7 Trust : Smart Contracts and Micropayment channels [12]

4 Masternode :

For high compute-intensive tasks the task provider's Node cannot handle the increased workload due to high network communication traffic, large amounts of working-memory demand and high cpu usage. in this case the task provider can delegate task's negotiation and coordination to a Masternode.

4-1 Masternode Minimum requirements :

Property	Value
HPP Funds	1000 HPP in wallet at least
Network connectivity	1 GB/s network connectivity
CPUs	24 cores
RAM	128 GB Memory
GPU Accelerator	High End GPU (Nvidia Tesla or AMD FirePro)
Storage	1 TB SSD

A Masternode can earn HPP coins on a time basis by carrying negotiation, coordination and results verification on behalf of a task provider.

The computation task price is negotiated between the Tasks provider and the Worker nodes based on the Extended Contract Net protocol [13].

5- Versions Roadmap

The live version of the project Roadmap is periodically updated here : https://trello.com/b/w4CnFCdV/hppcoin

V 1.0.0-Beta

-HPP Coin and built in miner

-Zerocoin protocol

-GPU Miner Cuda

-GPU Miner OpenCL

-Mining Pool (http://hppcoin.com)

-Block Explorer (http://explorer.hppcoin.com)

V 1.1.0

-Smart contacts

-Host Virtualization

-Support for HPC on multiple independent Nodes (suitable for parallel tasks that can be split into multiple independent tasks without the need for coordination among nodes)

V 1.2.0

-Dedicated Host Sharing

-Virtual Host Sharing

-Distributed OpenCL Platform[15] : This functionality will be released in the HPP V 1.2.0: Support for HPC on multiple coordinating nodes suitable for high parallel computation task that can be split into several subtasks executed on several distributed nodes requiring coordination among nodes.

V 1.3.0

-Micro payments channels

-Distributed OpenMP Platform : This functionality will be released in the HPP V 1.3.0.

V 2.0.0

-General Purpose HPC Platform

-Support for automatic deployment over multiple distributed nodes[16]

6 HPP Coin Specification

Property	Value
Premine	0 blocks (No Premine)
Ico	No ICO
Block reward	78 HPP
Coin base maturity	120 blocks
Founders and investors reward	8 HPP per block for the first 2 years (70 HPP goes to the block miner and 8 HPP for founders and investors) and 0 HPP after that.
Start time	8:50 AM Wednesday, November 22, 2017 (MST)
Total Supply	78 Millions HPP
Symbole	HPP (ˈeɪtʃ-ˈpiː-ˈpiː)
Halving rate	Every 262500 blocks approximately every 2 years
Block Time	4 minutes
Hashing Algorithm	LYRA2H
Transactions validation	PoW

7 Conclusion

HPP is not just a crypto-coin based on bitcoin[14] but an open source distributed platform for general purpose High Performances Computing, every entity that own computing power, ranging from individuals with a single laptop to companies and institutions that own big datacenter, can rent it's computing power and earn HPP coins that can be redeemed anytime at HPP platform to acquire more computing power or can be traded in cryptocurrencies Markets.

References

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