Methodology for Permance Evaluation of Ethereum Blockchain Infrastructure

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ABSTRACT

Blockchain is being recognized as a software infrastructure by its new feature of constructing blockchain using hash values. Two main features of blockchain are preserving the integrity of information and providing reward to the participants and those two features attract people to deploy the blockchain infrastructure for their newly launching services. However, the blockchain software infrastructure requires lots of computing resources to conduct all the required functionality. In addition, it is very hard to say that the blockchain infrastructure is adequate for performance sensitive software. In this presentation, we introduce our journey for evaluating the performance characteristics of blockchain particularly Ethereum. In our experiment, we devised new concepts for evaluation of performance of services such as time scaling (TS), experimental frame (EF) and system entity structure (SES). The time scale concept enables us to conduct the performance evaluation testing in a short period of time without the loss of context of the test. By introducing the experimental frame concept, we could separate the experiment scenarios from the testing target services. At last, the system entity structure helps us to test the diverse software composition for the same service. We developed test target services such as content delivery and auction service for the experiment. The main performance index of our experiment is turnaround time for the service request and we derived the index for each blockchain-based and database-based service to figure out the amount of performance degradation caused by the deployment of the services over the blockchain software infrastructure. Our experiment is not limited to the turnaround time. As a further study, we investigated every functionality of Ethereum blockchain such as mining, writing and verifying blocks and measured the time consumption of the procedures of Ethereum.