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Computer Modeling of a Dispersed Storage System for Private Data on Public Resources in P2P Networks for Determining the Optimal Values of its Parameters

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We present a project devoted to a development of a reliable, secure, and convenient dispersed storage system for private data on public resources in the Internet based on peer-to-peer (P2P) networks [1,2], as an alternative to centralized solutions, including clouds. Novelty of the offered project is the research of the behavior of dispersed storage system (DSS) and determining the optimal parameters of its operation under the conditions of high volatility of resources within a P2P network. The proposed method of solving the problem is the computer modeling and analysis of the various algorithms of routing of private data between its owners and the providers of the resources based on computer modeling, and multi-objective optimization of the parameters of information dispersal algorithms (IDA) [3] under the conditions of dynamically changing P2P network. In particular, effective integration of IDA in DSS implies mutual optimization of the choice of a particular variant of IDA, type (structured, unstructured, hybrid) of topology of the overlay P2P-networks, search and data routing algorithms, techniques for checking retrievability of undistorted data stored on a particular node of the network as well as the timely restoration of lost fragments in dynamically changing network.

There is a number of approaches and methods for the solution of tasks of such multi-objective optimization [4]. In particular, in the project it is supposed to use the adapted version of a method of the weighed sums (in more general context such approach is called a scalarization of the multi-objective optimization). Up to now these methods were not applied to assessment of efficiency of data stores on the basis of peer-to-peer networks. The parameters of DSS operation will be optimized for different external conditions and dynamic change of a network, in particular at different speeds and types of nodes disappearing (churn, failure, crash), and also joining of the network by new nodes. The study of the functioning of the network and the search for the optimal parameters of its operation will be based on computer simulation that will estimate functionality, performance, scalability and reliability of the DSS.

References

[1] J. Buford, H. Yu, and E.K. Lua. P2P Networking and Applications. Morgan Kaufmann. 2008.

[2] A. Malatras, State-of-the-art survey on P2P overlay networks in pervasive computing environments, Journal of Network and Computer Applications 55 (2015): 1-23.

[3] M. O. Rabin, "Efficient dispersal of information for security, load balancing and fault tolerance,"in Journal of the ACM, 36(2):335–348, 1989; A. Dimakis et al., A survey on network codes for distributed storage, Proceedings of the IEEE 99, no. 3 (2011): 476-489

[4] M. Ehrgott, Multicriteria Optimization, Birkhauser, 2005; R.E. Steuer, Multiple Criteria Optimization: Theory, Computations, and Application. - New York: John Wiley and Sons, 1986.

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