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基于自组织聚类的结构化P2P语义路由改进算法

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Abstract
Structured P2P Networks create a virtual topology on top of the physical topology. The only relation between the two layers is the hashing algorithm, which makes the node's logical ID independent of its physical location. By analyzing the Hash function, some novel logical connections among the destination node, the traditional semantic routing relay node sequence, and the ID of the clustering neighboring nodes are found. In this paper, the SCSRAA (self-organizing clustering semantic routing advanced algorithm) is resented to improve the efficiency of semantic routing. Since the clustering nodes only have local views in self-organizing mode, some rules are proposed for a node to learn other nodes' physical location. The SCSRAA's routing algorithm is described completely. Simulations have verified that the method can improve the semantic routing efficiently.

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摘要
结构化P2P网络是构建于物理网络拓扑之上的一层Overlay网络,两层之间的唯一联系是Hash散列函数,这种Hash关系使得节点的逻辑ID号与物理位置之间不存在任何联系.从分析Hash散列函数的性质入手,归纳出目的节点、传统(chord)语义路由中继节点序列、聚类邻居节点集三者之间的逻辑关联特性,并将其应用于所提出的基于自组织聚类的语义路由改进算法SCSRAA(self-organizing clustering semantic routing advanced algorithm)中,从而达到提高语义路由效率的研究目的.针对自组织模式下聚类节点仅存在局部视图的特性,详细讨论了聚类算法及节点获取其他节点物理位置信息的各种规则,给出了SCSRAA路由算法详尽的描述及理论分析.仿真实验表明,该算法具有较强的语义路由效率提升能力.

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References:

[1] Ratnasamy S, Shenker S, Stoica I. Routing algorithms for DHTs: Some open questions. In: Druschel P, Kaashoek M, Rowstron A, eds. Proc. of the 1st Int'l Workshop on Peer-to-Peer Systems (IPTPS 2002). Berlin: Springer-Verlag, 2002. 174-179.

[2] Zhao BY, Duan Y, Huang L, Joseph AD, Kubiatowicz JD. Brocade: Landmark routing on overlay networks. In: Druschel P, Kaashoek M, Rowstron A, eds. Proc. of the 1st Int'l Workshop on Peer-to-Peer Systems (IPTPS 2002). Berlin: Springer-Verlag, 2002.

[3] Krishnamurthy B, Wang J, Xie YL. Early Measurements of a cluster-based architecture for P2P systems. In: Proc. of the ACM SIGCOMM Internet Measurement Workshop. New York: ACM Press, 2001. 105-109. http://www.imconf.net/imw-2001/proceedings.htm

[4] Ratnasamy S, Handley M, Karp R, Shenker S. Topologically-Aware overlay construction and server selection. In: Proc. of the IEEE INFOCOM Conf. New York: Institute of Electrical and Electronics Engineers, Inc., 2002. 1190-1199. http://www.icir.org/sylvia/

[5] Stoica I, Morris R, Karger D, Kaashoek MF, Balakrishnan H. Chord: A scalable peer-to-peer lookup service for Internet applications. In: Proc. of the ACM SIGCOMM 2001 Conf. New York: ACM Press, 2001. 149-160. http://www.acm.org/sigs/sigcomm/sigcomm2001/

[6] Rowstron A, Druschel P. Pastry: Scalable, distributed object location and routing for large-scale peer-to-peer systems. In: Guerraoui R, ed. Proc. of the 18th IFIP/ACM Int'l Conf. on Distributed Systems Platforms (Middleware 2001). Berlin: Springer-Verlag, 2001. 329-350.

[7] Malkhi D, Naor M, Ratajczak D. Viceroy: A scalable and dynamic emulation of the butterfly. In: Proc. of the 21st annual ACM Symp. on Principles of Distributed Computing. New York: ACM Press, 2002. 183-192. http://www.podc.org/podc2002/

[8] Wang YB, Xue T. Applied Cryptography. Beijing: China Machine Press, 2003. 135-151 (in Chinese).

[9] Zegura EW, Calvert KL, Bhattacharjee S. How to model an internetwork. In: Proc. of the INFOCOM'96. New York: Institute of Electrical and Electronics Engineers, Inc., 1996. 594?602. http://www.cc.gatech.edu/fac/Ellen.Zegura/pubs1.html

附中文参考文献:

[8] 王衍波,薛通.应用密码学.北京:机械工业出版社,2003.135-151.