上海大学学报(自然科学版)
Journal of Shanghai University (Natural Science Edition)

上海大学学报(自然科学版) » 2013, Vol. 19 » Issue (1) :1-4 DOI: 10.3969/j.issn.1007-2861.2013.01.001

云计算中的弹性算法: 概要和展望

郭毅可, 韩锐

1. 上海大学计算机工程与科学学院, 上海200444; 2. 帝国理工学院计算机系, 伦敦SW72AZ

Elastic Algorithm in Cloud Computing: Overview and Prospect

GUO Yi-ke, HAN Rui

1. School of Computer Engineering and Science, Shanghai University, Shanghai 200444, China;
2. Department of Computing, Imperial College London, London SW72AZ, UK

摘要 近年来, 云计算已经成为一种支持按需(on-demand)提供计算资源的低成本传输模式. 在云平台上, 弹性的资源使用是一种基于“现用现付”(pay-as-you-go)的商业模式, 通过“按需”的原则来提供弹性的资源. 介绍一种新的弹性算法(elastic algorithm, EA), 即算法本身就是通过“现用现付”的方式组织起来. 在传统算法中, 计算是一个确定过程, 只会产生一种完整的结果或者没有结果. 与之对比, 弹性算法会随着资源的消耗而生成一组近似结果. 具体来说, 随着消耗的资源越来越多, 弹性算法能够保证产生更好质量的结果. 在这个意义上, 算法产生结果质量的好坏依赖于资源消耗的多少, 因此是具有弹性的. 最后, 正式定义弹性算法的必要性质, 并对弹性算法未来的研究方向进行展望, 提出一系列的研究挑战.

关键词: 云计算 现用现付 弹性算法

Abstract: In recent years, cloud computing has emerged as a cost-effective way to deliver on-demand and metered computing resources. In a cloud, elasticity of resource usage is typically realized through the “on-demand” provision principle supported by the “pay-as-you-go” business model. However, little has been investigated into elasticity of algorithm for cloud computing. This paper introduces a novel elastic algorithm (EA) in which the computation itself is organized in a “pay-as-you-go” fashion. In contrast to conventional algorithms, where computation is a deterministic process that only produces an “all-or-nothing” result, an EA generates a set of approximate results corresponding to its resource consumption. As more resources are consumed, better results can be derived. In this sense, quality of the algorithm is elastic to its resource consumption. The desirable properties for EA are formalized, and ambitious agenda for future research is provided in this area and propose several challenges.

Keywords: cloud computing, pay-as-you-go, elastic algorithm (EA)

收稿日期: 2012-11-28;

通讯作者 郭毅可(1962—), 男, 教授, 博士, 研究方向为云计算. Email: y.guo@imperial.ac.uk

引用本文:
.云计算中的弹性算法: 概要和展望[J] 上海大学学报(自然科学版), 2013,V19(1): 1-4
.Elastic Algorithm in Cloud Computing: Overview and Prospect[J] J.Shanghai University (Natural Science Edition), 2013,V19(1): 1-4
链接本文:
http://www.journal.shu.edu.cn//CN/10.3969/j.issn.1007-2861.2013.01.001 或 http://www.journal.shu.edu.cn//CN/Y2013/V19/I1/1

[1] Han R, Guo L, Guo Y, et al. A deployment platform for dynamically scaling applications in the cloud [C]// The 3rd IEEE International Conf on Cloud Computing

[2] Technology and Science. 2011: 506-510.

[3] Han R, Ghanem M M, Guo L, et al. Enabling costaware and adaptive elasticity of multi-tier cloud applications [J]. Future Generation Comp Systems, 2012, DOI: 10.1016/j.future.2012.05.018.

[4] Han R, Guo L, Ghanem M M, et al. Lightweight resource scaling for cloud applications [C]// The 12th IEEE/ACM International Symposium Cluster, Cloud and Grid Computing. 2012: 644-651.

[5] Poladian V, Sousa J P, Garlan D, et al. Dynamic configuration of resource-aware services [C]// The 26th International Conference on Sof

Engineering. 2004: 604-613.

[6] Gaber M M, Yu P S. A framework for resourceaware knowledge discovery in data streams: a holistic approach with its application to clust [C]// The 2006 ACM Symposium on Applied Computing. 2006: 649-656.

[7] Dean T L. Intractability and time-dependent planning [C]// The 7th National Conference on Artificial Intelligence. 1989: 245-266.

[8] Dean T, Boddy M. An analysis of time-dependent planning [C]// The 7th National Conference on Artificial Intelligence. 1988: 49-54.

[9] Zilberstein S. Using anytime algorithms in intelligent systems [J]. AI Magazine, 1996, 17: 73-83.

[10] Guo Y, Ghanem M, Han R. Does the cloud need new algorithms: an introduction to elastic algorithms [C]// The 4th International Confere Cloud Computing. 2012: 66-73.

[11] Pharr M, Humphreys G. Physically based rendering: from theory to implementation [M]. San Fransisco: Morgan Kaufmann, 2004: 1-43.

[1] 周文, 井明洋, 吴辰康, 徐怡秋, 马雯, 郭毅可, 张武.中国云计算产业结构和商业模式[J]. 上海大学学报(自然科学版), 2013,19(1): 26-30

[2] 谢江, 王旻超, 易荣贵, 夏上云, 张武.CPSE-Bio: 基于云计算的生物问题求解环境[J]. 上海大学学报(自然科学版), 2013,19(1): 21-25

[3] 董贺, 徐凌宇.基于云平台的软件服务流体系结构[J]. 上海大学学报(自然科学版), 2013,19(1): 14-20

[4] 张惠然, 戴佳筑, 李芝龙, 沈小龙.基于云计算平台的医疗健康监视系统[J]. 上海大学学报(自然科学版), 2013,19(1): 35-38

[5] 向劲锋, 雷州, 张龙, 沈文枫, 段峰.基于关系和状态的移动云位置信息服务[J]. 上海大学学报(自然科学版), 2013,19(1): 49-53

[6] 胡冠男, 卢志国, 詹华清, 陆铭, 朱文浩, 刘炜, 王晓伟, 张武.基于动态用户融合的云计算架构[J]. 上海大学学报(自然科学版), 2013,19(1): 31-34

[7] 蒋永生, 彭俊杰, 张武.云计算及云计算实施标准: 综述与探索[J]. 上海大学学报(自然科学版), 2013,19(1): 5-13