



Find out how to access preview-only content

Look Inside Get Access

Computing

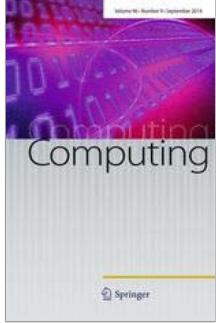
September 2014, Volume 96, Issue 9, pp 909-922

Date: 15 Jun 2013

Grid resource discovery based on distributed learning automata

Abstract

This paper focuses on resource discovery problem for Grid. Grid is a devices and services environment that has evolved with the goal of resource sharing. Grid resource discovery encompasses locating and retrieving computational resources. Existing resource discovery solutions are not well adapted to the dynamicity and heterogeneity of Grid. Query propagation is a novel approach that forwards an unsupported query from its resident peer to an adjacent peer. The concept of next generation intelligent Grid environments needs intelligent modules for resource discovery. Learning automaton is a stochastic tool with learning ability which simply adapts to the progressive environmental changes. The proposed method utilizes a distributed learning automata (DLA) which is a network of learning automata (LA). Here, multiple DLA are used for forwarding domain-specific queries. Different Grid scales are utilized for evaluation of the proposed method. Results demonstrate that the resource discovery based on DLA optimizes resource utilization, maximizes throughput, minimizes response time and avoids overload. Moreover, the algorithm is also scalable, fully distributed and failure-free.



Citations

Related Content**References (32)**

1. Foster I, Kesselman C, Tuecke S (2001) The anatomy of the grid. *Int J Supercomput Appl* 15(3):1–25 CrossRef
2. Krauter K, Buyya R, Maheswaran M (2002) A taxonomy and survey of grid resource management systems for distributed computing. *Softw Pract Exp* 32(2):135–164 CrossRef
3. Foster I, Kesselman C, Nick JM, Tuecke S (2002) Grid services for distributed system integration. *Computer* 35(6):37–46 CrossRef
4. Karaoglanoglou K, Karatza H (2011) Resource discovery in a Grid system: directing requests to trustworthy virtual organizations based on global trust values. *J Syst Softw* 84(3):465–478 CrossRef
5. Czajkowski K, Fitzgerald S, Foster I, Kesselman C (2001) Grid information services for distributed resource sharing. In: Proceedings of the 10th IEEE international symposium on high performance distributed computing, 2001, pp 181–194
6. Iamnitchi A, Foster I (2001) On fully decentralized resource discovery in Grid environments. In: Lee C (ed) Grid computing—GRID, vol 2242, Springer, Berlin/Heidelberg, pp 51–62
7. Iamnitchi A, Foster I, Nurmi DC (2003) A peer-to-peer approach to resource location in grid environments. In: Internaional series in operaions research and management science, vol 64, pp 413–430
8. Mastroianni C, Talia D, Verta O (Oct. 2008) Designing an information system for Grids: comparing hierarchical, decentralized P2P and super-peer models. *Parallel Comput* 34(10):593–611
9. Narendra KS, Thathachar M (1974) Learning automata: a survey. *IEEE Trans Syst Man Cybern* 4:323–334 CrossRef
10. Narendra KS, Thathachar MAL (1989) Learning automata: an introduction. Prentice-Hall Inc., Englewood Cliffs
11. Beigy H, Meybodi MR (2011) Learning automata based dynamic guard channel algorithms. *Comput Electr Eng* 37(4):601–613
12. Mohamadi H, Ismail ASBH, Salleh S (2013) A learning automata-based algorithm for solving coverage problem in directional sensor networks. *Computing* 95(1):1–24
13. Esnaashari M, Meybodi MR (2012) Deployment of a mobile wireless sensor network with k-coverage constraint: a cellular learning automata approach. *Wireless Netw*, pp 1–24
14. Hashemi AB, Meybodi MR (Jan. 2011) A note on the learning automata based algorithms for adaptive parameter selection in PSO. *Appl Soft Comput* 11(1):689–705
15. Hasanzadeh M, Meybodi MR, Ebadzadeh MM (2013) Adaptive cooperative particle swarm optimizer. *Appl Intell*
16. Beigy H, Meybodi MR (2006) Utilizing distributed learning automata to solve stochastic shortest path problems. *Int J Uncertain Fuzziness Knowl Based Syst* 14(5):591 CrossRef
17. Akbari Torkestani J, Meybodi MR (2010) An intelligent backbone formation algorithm for wireless ad hoc networks based on distributed learning automata. *Comput Netw* 54(5):826–843 CrossRef
18. Forsati R, Meybodi MR (2010) Effective page recommendation algorithms based on distributed learning automata and weighted association rules. *Expert Syst Appl* 37(2):1316–1330 CrossRef
19. Kakali VL, Sarigiannidis PG, Papadimitriou GI, Pomportsis AS (2011) A novel adaptive framework for wireless push systems based on distributed learning automata. *Wireless Personal Commun* 57(4):591–606 CrossRef
20. Soleimani-Pouri M, Rezvanian A, Meybodi MR (2012) Solving maximum clique problem in stochastic graphs using learning automata. In: Proceedings of 4th international conference on computational aspects of social networks (CASON), pp 115–119
21. Noghabi HB, Ismail AS, Ahmed AA, Khodaei M (2012) Opimized query forwarding for resource discovery in unstructured peer-to-peer grids. *Cybern Syst* 43(8):687–703 CrossRef
22. Campos J, Esteva M, López-Sánchez M, Morales J, Salamó M (2011) Organisational adaptation of multi-agent systems in a peer-to-peer scenario. *Computing* 91(2):169–215 CrossRef
23. Deng Y, Wang F, Ciura A (2009) Ant colony optimization inspired resource discovery in P2P Grid systems. *J Supercomput* 49(1):4–21 CrossRef
24. Beverly Yang B, Garcia-Molina H (2003) Designing a super-peer network. In: Proceedings of the 19th international conference on data engineering 2003, pp 49–60
25. Akbari Torkestani J (2012) A new approach to the job scheduling problem in computational grids. *Cluster Comput* 15(3):201–210

26. Jahanshahi M, Dehghan M, Meybodi MR (2013) LAMR: learning automata based multicast routing protocol for multi-channel multi-radio wireless mesh networks. *Appl Intell* 38(1):58–77
27. Mora-Gutiérrez RA, Ramírez-Rodríguez J, Rincón-García EA, Ponsich A, Herrera O (2012) An optimization algorithm inspired by social creativity systems. *Computing* 94(11):887–914
28. Hasanzadeh M, Meybodi MR, Shiry S (2011) Improving learning automata based particle swarm: an optimization algorithm. In: Proceedings of the 12th IEEE international symposium on computational intelligence and informatics, Budapest
29. Hasanzadeh M, Meybodi MR, Ebadzadeh MM (2012) A robust heuristic algorithm for cooperative particle swarm optimizer: a learning automata approach. In: Proceedings of the 20th Iranian conference on electrical engineering (ICEE), pp 656–661
30. Buyya R, Murshed M (2002) Gridsim: a toolkit for the modeling and simulation of distributed resource management and scheduling for grid computing. *Concurr Comput Practice Exp* 14(13–15):1175–1220 CrossRef
31. Jeanvoine E, Morin C (2008) RW-OGS: an optimized randomwalk protocol for resource discovery in large scale dynamic Grids. In: Proceedings of the 9th IEEE/ACM international conference on Grid computing. Washington, DC, USA, pp 168–175
32. Dimakopoulos VV, Pitoura E (2006) On the performance of flooding-based resource discovery. *IEEE Trans Parallel Distrib Syst* 17(11):1242–1252 CrossRef

About this Article

Title

Grid resource discovery based on distributed learning automata

Journal

Computing

Volume 96, Issue 9 , pp 909–922

Cover Date

2014-09-01

DOI

10.1007/s00607-013-0337-x

Print ISSN

0010-485X

Online ISSN

1436-5057

Publisher

Springer Vienna

Additional Links

- Register for Journal Updates
- Editorial Board
- About This Journal
- Manuscript Submission

Topics

- Computer Science, general
- Information Systems Applications (incl. Internet)
- Computer Communication Networks
- Software Engineering
- Artificial Intelligence (incl. Robotics)
- Computer Appl. in Administrative Data Processing

Keywords

- Grid computing
- Resource discovery
- Learning automata (LA)
- Distributed learning automata (DLA)
- 68 Computer Science
- 68T05 Learning and adaptive systems

Industry Sectors

- Electronics
- IT & Software
- Telecommunications

Authors

- Mohammad Hasanzadeh ⁽¹⁾
- Mohammad Reza Meybodi ⁽¹⁾

Author Affiliations

- 1. Soft computing Laboratory, Computer Engineering and Information Technology Department, Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran

Continue reading...

To view the rest of this content please follow the download PDF link above.