

EXHIBIT 2



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Goyal

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(54) **SYSTEM AND METHOD FOR PROVIDING A SCALABLE ON DEMAND HOSTING SYSTEM**

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(51) **Int. Cl.**

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(52) **U.S. Cl.** **718/105**; 718/1; 718/104; 709/201; 709/202; 709/223; 709/226

(58) **Field of Classification Search** 718/1, 718/100-108; 709/201-203, 223-226
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,101,616 A 8/2000 Joubert et al.
6,324,177 B1 11/2001 Howes et al.
6,332,180 B1 * 12/2001 Kauffman et al. 711/153
6,393,455 B1 * 5/2002 Eilert et al. 718/105
6,732,139 B1 * 5/2004 Dillenberger et al. 718/102
6,854,114 B1 * 2/2005 Sexton et al. 718/1
7,080,378 B1 * 7/2006 Noland et al. 718/104

7,117,499 B2 * 10/2006 Kawamoto et al. 718/105
7,171,668 B2 * 1/2007 Molloy et al. 718/105
2001/0049741 A1 12/2001 Skene et al.
2002/0032850 A1 3/2002 Kauffman
2002/0099759 A1 * 7/2002 Gootherts 709/105
2005/0160423 A1 * 7/2005 Bantz et al. 718/1

OTHER PUBLICATIONS

Andrzejak, Artur et al. "Bounding the Resource Savings of Utility Computing Models." Hewlett Packard Laboratories. Dec. 6, 2002.*

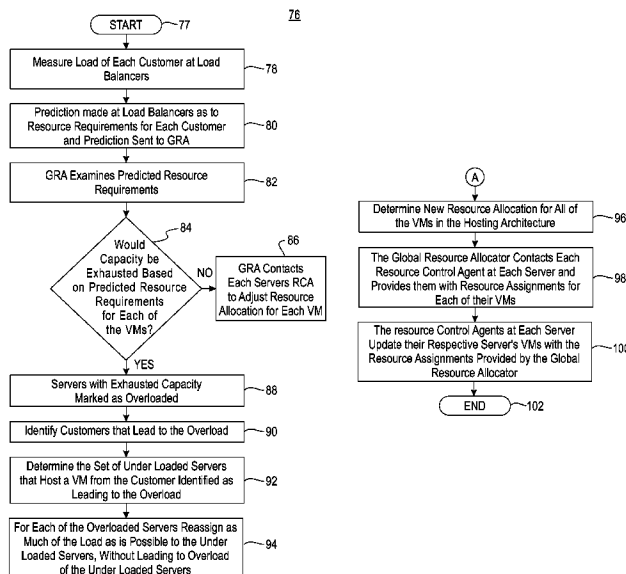
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(57) **ABSTRACT**

A VM based hosting architecture system in which finer grain control in optimizing multiple workloads across multiple servers is provided. The system includes a plurality of servers to be utilized by multiple workloads. In addition, the system includes a plurality of virtual machines (VMs) at each of the plurality of servers, wherein the plurality of VMs at each of the plurality of servers each serve a different one of the multiple workloads. Moreover, the system includes resource management logic to distribute server resources to each of the plurality of VMs according to predicted resource needs of each of the multiple workloads. Each of the multiple workloads are distributed across the plurality of servers, wherein fractions of each of the multiple workloads are handled by the plurality of VMs. The distribution of multiple workloads over multiple servers has the effect of achieving a finer grain control in optimizing workloads across the plurality of servers.

16 Claims, 4 Drawing Sheets



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OTHER PUBLICATIONS

Keller, Axel et al. "Anatomy of a Resource Management System for HPC Clusters." Nov. 2000.*

Kotov, Vadim. "On Virtual Data Centers and Their Operating Environments." Hewlett Packard Laboratories. Mar. 8, 2001.*

Abdelzaher, Tarek et al. "Performance Guarantees for Web Server End-Systems: A Control-Theoretical Approach." IEEE. Jan. 2002.*

Graupner, Sven et al. "Resource-Sharing and Service Deployment in Virtual Data Centers." IEEE. 2002.*

Rolia et al., "Adaptive Internet Data Centers", HP Labs, CA, pp. 1-8.*

Lassetre et al., "Dynamic Surge Protection: An Approach to Handling Unexpected Workload Surges With Resource Actions That

Have Dead Times," published on the web at www.research.ibm.com/autonomic/research/projects.html .6 pages.

Chandra et al., "Impact of Space-Time Multiplexing Granularity on Provisioning in On-Demand Data Centers: Opportunities and Challenges," published on the web at <http://lass.cs.umass.edu/~lass/papers/ps/TR03-03.ps>., 5 pages.

Chandra et al., "Quantifying the Benefits of Resource Multiplexing in On-Demand Data Centers," Proceedings of the First ACM Workshop on Alg. and Arch. for Self-Managing Syst. (Self-Manage 2003), San Diego, CA, Jun. 2003.

* cited by examiner

10

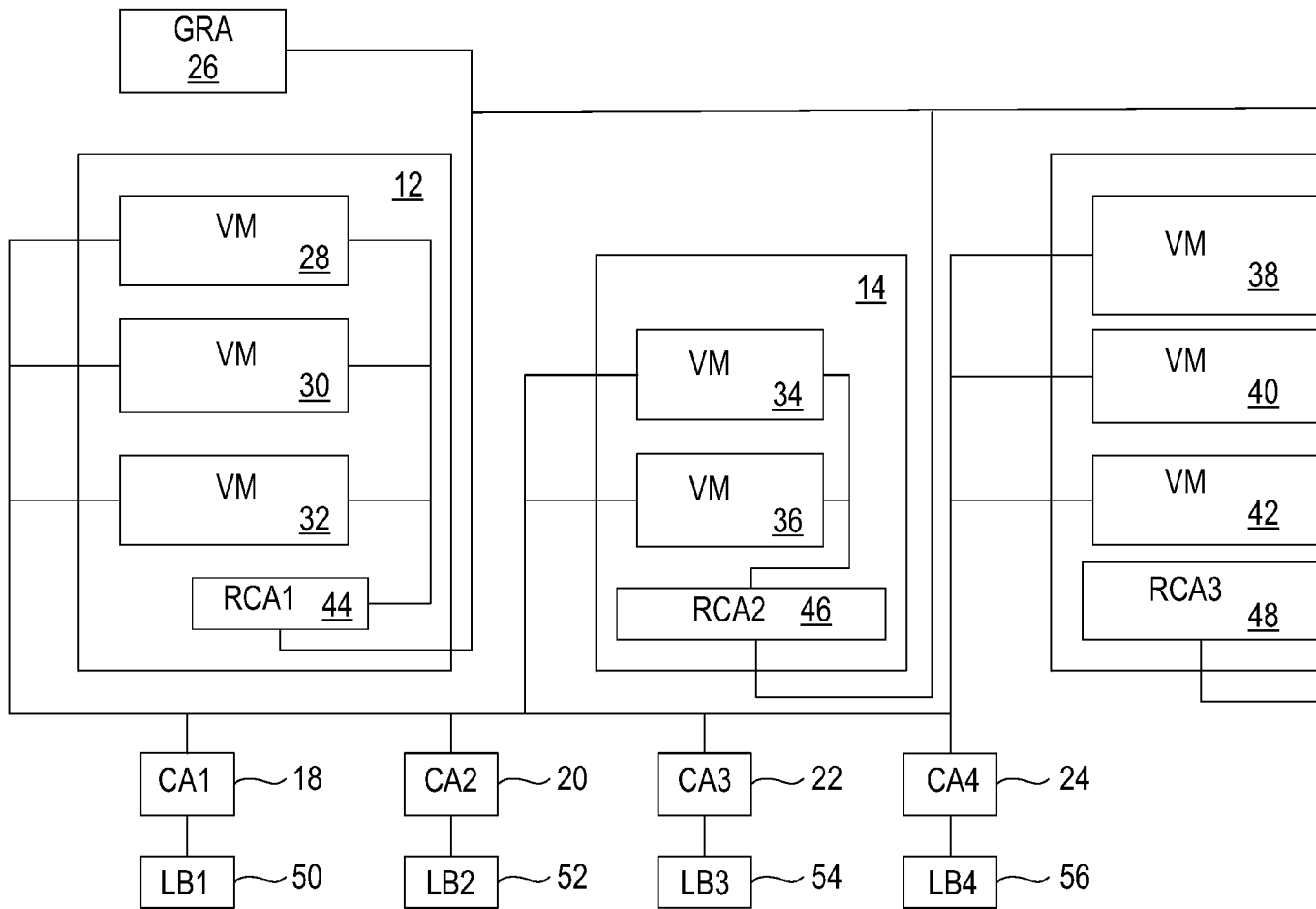


FIG. 1

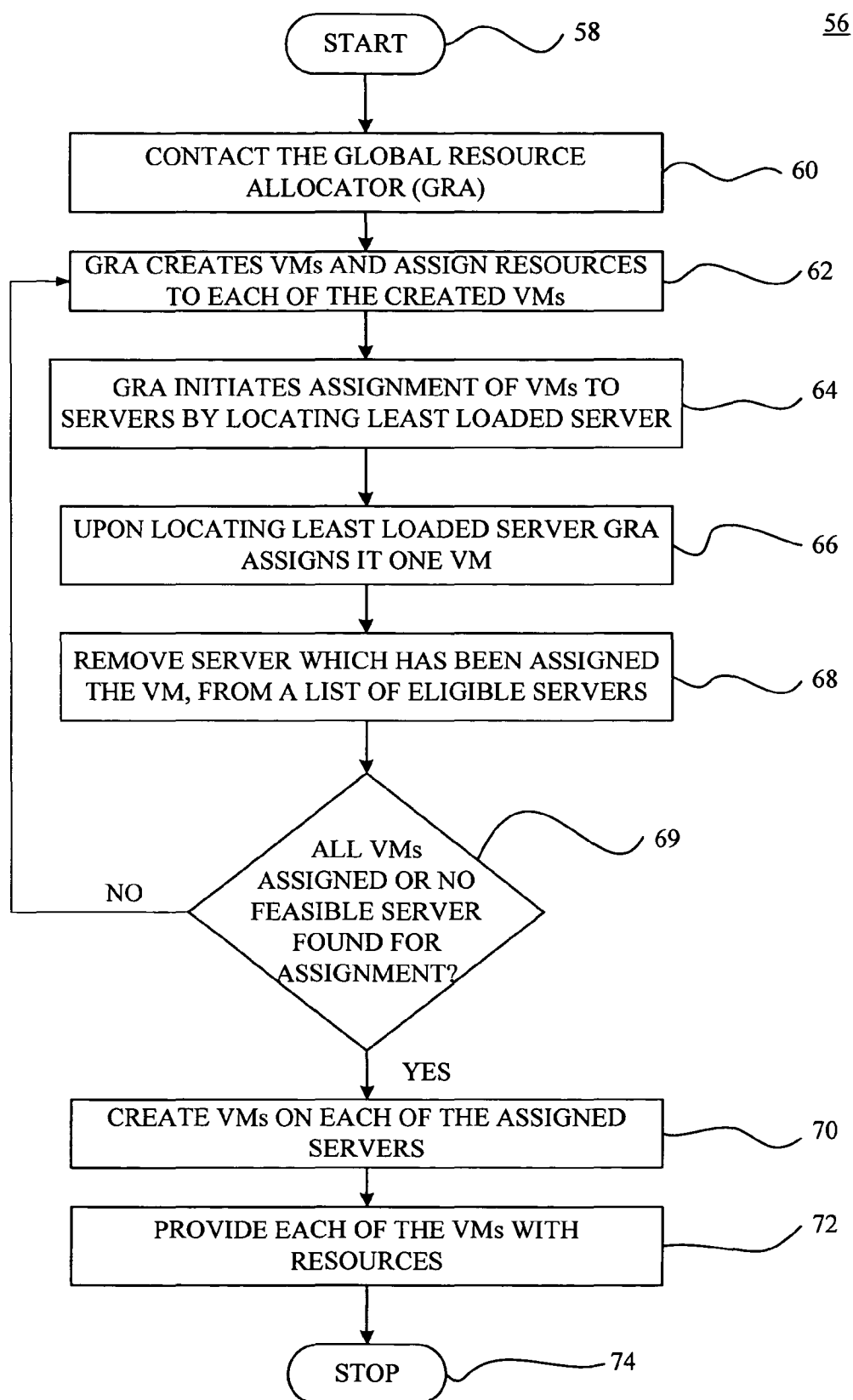


FIG. 2

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