



## New Framework Helps Compose and Scale Middlebox Software Modules for Cloud Computing

[View U.S. Patent No. 9,104,492 in PDF format.](#)

**WARF: P120286US01**

Inventors: Srinivasa Akella, Ashok Anand, Aaron Gember-Jacobson, Robert Grandl, Theophilus Benson

**The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing Stratos, a framework that recognizes middleboxes as first-class entities and enables cloud users to easily optimize their usage.**

### Overview

Cloud computing is an emerging model for the delivery and consumption of information technology (IT) resources. Infrastructure-as-a-service cloud providers deliver virtual servers along with network connectivity and storage on demand. The providers automatically provision these resources as they are requested by end users. The end users may leverage virtual servers from third-party vendors, in-house data centers or a combination of the two to meet their IT needs.

As end users deploy applications on these virtual servers, they also frequently need to deploy important supporting services within the networks to ensure the security and performance of the applications. These supporting services are hardware or software modules, called middleboxes, which examine and modify network traffic. Examples include firewalls, load balancers and duplication elimination systems.

Including middleboxes in today's infrastructure-as-a-service clouds is extremely challenging due to a lack of support, vulnerability to overload and suboptimal placement. Existing technologies require complex, labor intensive redesigns to secure and optimize performance.

### The Invention

UW-Madison researchers have developed a new methodology for managing these challenges. Called Stratos, the framework recognizes middleboxes as first-class entities in cloud infrastructures – centralizing and automating configuration, management, scaling and placement of middleboxes – empowering end users to easily secure and optimize their applications.

### Applications

- Software offered to consumers by cloud providers and IT vendors

### Key Benefits

- Deployable in today's clouds
- Stratos could be offered as an additional service without requiring changes to existing network infrastructure.

We use cookies on this site to enhance your experience and improve our marketing efforts. By continuing to browse without changing your browser settings to block or delete

- Controls data transfer cookies; you agree to the storing of cookies and related technologies on your device. [See our privacy policy.](#)

- Low overhead

OK



**WARF**  
Wisconsin Alumni Research Foundation

| [info@warf.org](mailto:info@warf.org) | 608.960.9850

- Helps cloud users meet application service level agreements (SLAs)

## Stage of Development

The development of this technology was supported by WARF Accelerator. WARF Accelerator selects WARF's most commercially promising technologies and provides expert assistance and funding to enable achievement of commercially significant milestones. WARF believes that these technologies are especially attractive opportunities for licensing.

## Additional Information

### For More Information About the Inventors

- [Srinivasa Akella](#)

### Publications

- [Gember A., Grandl R., Anand A., Benson T. and Akella A. 2012. Stratos: Virtual Middleboxes as First-Class Entities. University of Wisconsin-Madison Department of Computer Science, TR1771.](#)
- Gember A., Prabhu P., Ghadiyali Z. and Akella A. 2012. Toward Software-Defined Middlebox Networking. HotNets-XI, Seattle, WA.

### Tech Fields

- [Information Technology : Networking & telecommunications](#)

For current licensing status, please contact Emily Bauer at [emily@warf.org](mailto:emily@warf.org) or 608-960-9842

We use cookies on this site to enhance your experience and improve our marketing efforts. By continuing to browse without changing your browser settings to block or delete cookies, you agree to the storing of cookies and related technologies on your device. [See our privacy policy.](#)

OK



**WARF**  
Wisconsin Alumni Research Foundation

| [info@warf.org](mailto:info@warf.org) | 608.960.9850