

USDA Builds State-of-the-Art Private Cloud to Help the Farmer

USDA Overview

The federal government has mandated the adoption of cloud computing as a best practice, and government IT professionals are now looking to understand how it can benefit their organizations and be deployed cost-effectively and quickly. One of the best examples of this mandate in action is the USDA National Resource Conservation Service's (NRCS) Cloud Services Innovation Platform (CSIP). Built on the open source Eucalyptus private cloud software, CSIP is a state-of-the-art system that serves as a development platform to facilitate the migration of existing scientific modeling applications within NRCS for deployment to any EC2-compatible Infrastructure-as-a-Service (IaaS) cloud environment. CSIP is enabling the NRCS to move its costly and inefficient "stovepipe" environmental modeling client applications to a cost-effective, easily accessible and scalable cloud-based system to better support its mission: helping the farmer.

The Challenge

Like many government agencies, the USDA's NRCS is going through a process of re-structuring its IT infrastructure to work more effectively and efficiently. The agency's 12,500 planners in over 2,000 field offices go out into the fields and work directly with farmers and ranchers to help them assess and address critical conservation issues such as erosion using a wide variety of environmental modeling tools. Until recently, all of these 100+ modeling tools were client applications that the NRCS distributed to all 12,500 worker's computers individually. Each application had its own interface, database and other unique requirements, and over time, the agency was burdened with managing an inefficient morass of "stovepipe" applications. Add to that multiple versions, updates and other complexities, and the maintenance of these valuable environmental modeling tools was becoming extremely costly and time-consuming. Starting in 2009, the NRCS began looking at cloud computing as a means of centralizing resources, cutting costs and providing a more scalable and flexible IT backbone for the agency and its thousands of field workers.

The Eucalyptus Solution

"Our NRCS planners will be able to leverage these cloud computing services to aid farmers and ranchers in their support of a healthy environment, and enable productive use of their land – we can help them decide on the best course of action for critical issues that affect their business and livelihood."

–Ken Rojas, senior project manager for the USDA Natural Resource Conservation Service (NRCS) Information Technology Center

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A key component of the NRCS's new IT architecture is its Object Modeling System (OMS) for use in the Conservation Delivery Streamlining Initiative (CDSI). OMS is a computer framework that takes an existing environmental model and turns it into a Web service that can be run in the cloud. Providing a uniform system of evaluation and delivery of models to users, the current primary application of OMS is to deliver scientific modeling services to improve technical assistance to farmers and ranchers.

To test the OMS, NRCS needed a cloud, and it chose to work with the Eucalyptus open source private cloud software. Eucalyptus is the world's most widely deployed software platform for on-premise (private) Infrastructure-as-a-Service (IaaS) clouds. Eucalyptus uses existing infrastructure to create a scalable, secure Web services layer that abstracts compute, network and storage to offer IaaS. Eucalyptus clouds are fully compatible with the Amazon Web Service (AWS) public cloud APIs, making it easy for organizations to migrate virtual servers between Eucalyptus and AWS as well as leverage the vibrant AWS ecosystem and management tools to manage Eucalyptus clouds. The NRCS chose Eucalyptus because of its open source quality, availability and affordability, along with its full compatibility with AWS.

With Eucalyptus, the NRCS has developed an efficient system for running its new Web services applications in the cloud, called Cloud Services Innovation Platform (CSIP). Created in one month, CSIP leverages open source software to build Eucalyptus clouds that facilitate the migration of existing NRCS scientific modeling applications to any AWS EC2-compatible cloud environment.

Using the Eucalyptus-based CSIP, the NRCS has started to demonstrate the power of having its environmental modeling tools be easily accessible as a Web service from the cloud. Engineers working with the NRCS have developed an application that enables field workers to access one of its most important apps for addressing soil erosion, called "RUSLE2", from an Android-based mobile device.

Imagine, for instance, a situation where a farmer and a NRCS planner can pick up a mobile phone in the field and immediately get detailed answers on soil erosion under various agriculture management practices simply by connecting to OMS and using cloud compute modeling services.

This kind of capability significantly enhances levels of efficiency at the NRCS, empowering it to deliver better support to farmers and ranchers, while also reducing the maintenance and costs.

The Eucalyptus cloud software is a key player in the NRCS CDSI effort to re-focus its IT assets to provide more effective and timely support and interaction with farmers and ranchers. For the near term, the NRCS will continue to move over legacy client applications to the cloud, repeating a pattern established with tools like RUSLE2. While the CSIP cloud environment is currently running on various shared or on-premise servers, the NRCS could potentially move to a hybrid cloud environment running some applications in AWS but keeping more sensitive data in Eucalyptus – there are many USDA alternatives under consideration along this front. The unique compatibility of Eucalyptus with AWS could make the transition to a hybrid architecture completely seamless.

The USDA NRCS is making waves in government IT circles with its innovative OMS system running on the Eucalyptus-based CSIP. The OMS provides a much-needed means of converting legacy client applications into flexible, easily accessible Web services that run on a scalable and elastic cloud infrastructure. While the OMS is being tested now with the NRCS's environmental modeling apps, it can be applied much more broadly, and many public groups outside the USDA are lining up to take advantage of it and move to the cloud.

About Eucalyptus Systems

Eucalyptus Systems provides IT organizations in enterprises, government agencies and Web and mobile businesses with the most widely deployed **cloud software** platform for on-premise Infrastructure-as-a-Service (IaaS).

To date, over 25,000 Eucalyptus clouds have been started all over the world, including more than 20 percent of Fortune 100 companies. Eucalyptus is specifically designed for enterprise cloud use, and the software platform is uniquely suited for private cloud or hybrid cloud computing. Built as an **open source cloud** product, Eucalyptus supports the industry-standard **Amazon Web Services (AWS)** cloud APIs, as well as all major virtualization platforms including Xen, KVM and VMware vSphere, ESX and ESXi.

The company has an active and growing ecosystem of customers, partners, developers and researchers that benefit from Eucalyptus' open, fast and standards-compliant path to cloud computing. For more information about Eucalyptus, please visit www.eucalyptus.com.

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