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NOVEMBER 21, 2011

InfoWorld's top 10 emerging enterprise technologies

Which of today's newest shipping technologies will triumph over the long haul? Here are our best guesses

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1 2 3 4 5 6 7

OpenFlow is the brainchild of university researchers who wanted a way to experiment with new network protocols on large production networks, and first emerged from the lab to overcome networking challenges posed by running enormous big data processing clusters in the public cloud. The next order of business will be solving the problems posed by large-scale virtualization and multitenancy in public and private clouds.

OpenFlow is still emerging, the functionality is currently limited, and it will take more time before the goals are even clearly defined. The consortium behind OpenFlow, the Open Networking Foundation, is less than a year old, but it counts the likes of Facebook, Google, Microsoft, Yahoo, Cisco Systems, Juniper Networks, Hewlett-Packard, Citrix Systems, Dell, IBM, NEC, and VMware as members. All these companies are betting on software-defined networking to make provisioning and managing networks in tomorrow's data centers and clouds as flexible and dynamic as managing virtual machines in today's virtualization clusters. --*Doug Dineley*

1. Private cloud orchestration

The old method of dedicating infrastructure and admins to individual projects is killing us, resulting in underutilized capacity, high administrative overhead, and drawn-out project cycles. One solution is to pool compute, storage, and network resources in a private cloud -- and move IT toward more agile and efficient shared architectures.

With a private cloud, IT managers can borrow technologies and architectures pioneered by public cloud providers and apply them [to their own data center](#). These clouds tend to have many moving parts, including virtualization management, metering and chargeback systems, automated configuration, and self-service provisioning.

Currently, these technologies tend to be spread across various products and solutions. But one in particular has gained surprising momentum over the past year. It's an [open source project known as OpenStack](#), which offers a core set of cloud orchestration services: virtual machine management, object storage, and image services.

Billing itself as a "cloud operating system," OpenStack was initially developed by Rackspace and NASA, but plans to spin off the project as a separate foundation were detailed last month. It now claims over 138 participating companies, including AMD, Cisco, Citrix, Dell, F5, HP, Intel, NEC, and a gaggle of cloud startups. According to OpenStack, identity and self-service layers will be included in the next release in 2012. In addition, several vendors are vying to offer commercialized versions of OpenStack, from Citrix (with its Project Olympus) to startup vendors Internap, Nebula, and Piston Cloud Computing.



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The best-known OpenStack competitor is [Eucalyptus](#), which is basically a private cloud implementation of Amazon Web Services. The Amazon interoperability runs deep, because the Eucalyptus stack includes a layer that mimics Amazon's API. You can move workloads from Amazon EC2 to Eucalyptus, as long as you don't stumble over a few subtle differences between the two. Eucalyptus also comes in an open source version.

Packages of private cloud tools are appearing at all layers of the stack. Puppet, to take a leading example, is a configuration management framework designed to automate almost any repeatable task in the data center. Puppet can create fresh installs and monitor existing nodes; push out system images, as well as update and reconfigure them; and restart your services -- all unattended. Puppet Labs, the developer of Puppet, partners with both Eucalyptus and OpenStack.

It's easy to be cynical about any cluster of technology to which the term "cloud" is applied. But no one questions the benefits of large-scale virtualization or other schemes, such as network convergence, that pool resources for greater economies of scale. These paradigm changes demand new ways of working -- and the emerging collection of cloud orchestration software supplies the means. --Eric Knorr

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[previous page](#)

1 2 3 4 5 6 7

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