Kubernetes Drives Modernization
and Secure Cloud Migration

Why are federal agencies embracing Kubernetes? Most federal agencies are very large and run decades old legacy systems for thousands of users, so Kubernetes offers them the opportunity to modernize and move to the cloud in a secure way while at the same time creating an innovative agency culture and scaling applications to service both federal workers and the public.

In a recent survey of federal IT managers done for Red Hat by FCW Market Insights, 56.7% said improved scalability and availability were the top reasons for adopting Kubernetes, while 53.7% cite security needs, 52.4% said cost optimization, and 47.8% say digital transformation, modernization, and cloud migration moved them to adopt Kubernetes.

Kubernetes operates as a system that manages containerized applications where a container functions essentially as a lightweight virtual machine. To build an application, software developers need to build a group of containers and then use Kubernetes to manage those containers across an enterprise.
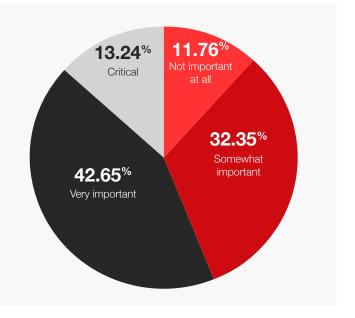
John Osborne, chief architect at Red Hat, said the ability to scale has become important as federal agencies move applications out to the edge. In a survey

last year, the Cloud Native Computing Foundation found that 58% of respondents use Kubernetes at the edge: 37% in production and 21% in proof of concept projects.

Osborne said agencies as diverse as the Defense Department, State Department, and NASA, need edge technologies they can scale up to thousands of users and are easy to fix if a device breaks down in the field. At the Defense Department, users at the edge may need to use a data entry application to pull data from a central command center, or intelligence people in the field may need to send back data to a headquarters location in the United States or elsewhere around the world.

"It may be a warfighter or embassy person in a remote location, so there's not always somebody technical available to fix the device, or the user may not even know anything about the underlying technology," said Osborne. "There's really a need for automation because they are rolling out a large number of devices. The agencies need it to work like an appliance, where if something goes wrong the person on-site can press an on/off button and the device will easily self-heal and reboot."

Modernization also rates as an important factor for adopting Kubernetes, said Osborne. For example,

How important is it that the provider of your Kubernetes platform is deeply rooted in the Kubernetes open source community?

13.24% Critical
11.76% Not important at all
32.35% Somewhat important
42.65% Very important

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many federal agencies are running old Java apps that are 20 years old and run in a very specific sequence that can take up to 10 minutes to load. They also tend to have old storage requirements and use custom code to reboot the servers. Now, they can run more efficiently by packaging their old code into containers and running them on a Kubernetes-based platform, said Osborne.

The Kubernetes market matures

Just a few years ago, many federal agencies started by using Kubernetes to port web applications, which Osborne said in many ways was the low-hanging fruit. Today, agencies are porting back-end code to Kubernetes, such as RESTful APIs that handle complex business logic for client-facing applications. They are also using Kubernetes to run data ingestion workloads such as Apache Kafka and other common backend services such as caching and databases.
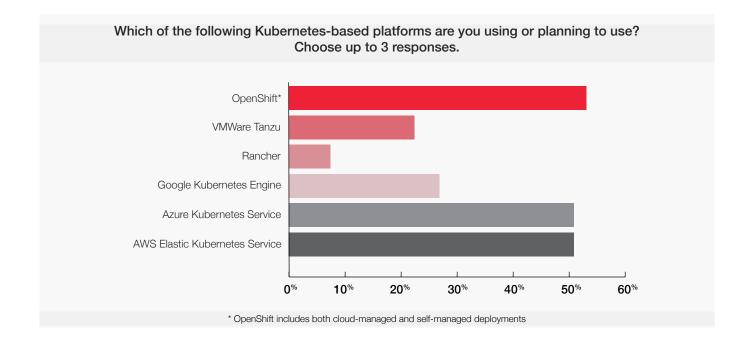
"In the public sector, a lot of federal agencies are looking to do new things, try new architectures, such as running containers and serverless computing in the cloud, it helps them create a better, more innovative culture," said Osborne.

The FCW Market Insight study supports Osborne's comments by reporting that 56% said they deployed Kubernetes to transform existing development and deployment processed, 51% say they want to

accelerate the delivery of existing applications, 37% cited bringing new applications to market faster – and nearly 25% said their agency was looking to foster a culture of innovation.

Agencies want these Kubernetes deployments to be easy to install and configure (42.2%), have the ability to both self-manage a platform and consume as a managed service (37.9), and offer a fully-managed container platform-as-a-service running in the cloud (33.3%). Agencies also want automated patching for the Kubernetes control plane and they want the containers orchestrated (30.3%), they need a platform that includes cloud native applications development tools (30.3%), and the ability to consistently deploy applications across their on-premises data centers and public cloud environments (30.3%).

In one example of a service that was developed, after working closely with Red Hat's Open Innovation Labs group, an Air Force team went on to independently design, validate, and build a minimum viable product for its new flight scheduling system, Puckboard. The Air Force team also integrated its existing DevSecOps tools and continuous delivery (CD) pipeline so it could automate security scans, testing, and deployment for the new flight scheduling system, further proof that federal agencies are looking to deploy automated applications that can self-manage.

Which of the following Kubernetes-based platforms are you using or planning to use? Choose up to 3 responses.

* OpenShift includes both cloud-managed and self-managed deployments

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The Kubernetes open source community

Federal agency IT managers have watched the Kubernetes market mature and nearly 43% says it's "very important" to them to have a provider that's deeply rooted in the Kubernetes open source community, while another 13% view the connection to the broader community as a "critical" feature. Nearly one-third (32.4%) say it's "somewhat important."

Osborne said Red Hat's OpenShift platform has been "all-in" on the Kubernetes open source community for several years. Red Hat offers a turnkey solution that lets federal agencies leverage the Kubernetes ecosystem to select the best-of-breed product for each function. Osborne added that Amazon Web Services offers 17 services that run on containers.

"So if you go with AWS, you have to use their storage, identity management, and networking pieces," Osborne says. "With Red Hat's open source approach, it's less about vendor lock-in versus trying to find the best technology for the job. So for example, if an agency wants to use Okta for identity management, Okta ships its software designed to run on Kubernetes. Hundreds of vendors in the open source community have standardized on Kubernetes."

In many ways, Osborne said Red Hat doesn't have to sell Kubernetes anymore, it's a mature

technology that speaks for itself. Today, Red Hat's engineers are more focused on developing turnkey, cloud-based solutions based on best-of-breed technologies. While many federal agencies purchase their Kubernetes services from the major three public cloud providers, Osborne believes that will change as more agencies share their stories and tell their federal colleagues about the benefits of the open source Kubernetes community.

Osborne said the ecosystem has become so massive and industry has gotten behind it, even companies like AT&T and Fidelity now contribute to Kubernetes –the community is a lot more than just software vendors.

"By going with open source you're getting the best solution," Osborne said. "For example, the largest acceleration around serverless is based on projects that run on Kubernetes containers. Red Hat has been supporting things like Azure Functions, which is Microsoft's serverless solution built around Kubernetes. When you go 'all-in' on Kubernetes you're getting the full ecosystem and you're betting on the best pieces of that ecosystem – hundreds of vendors that have standardized around a common API."

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