

# Accelerating ICITE With Open Source



INDUSTRY PERSPECTIVE

# INTRODUCTION

Perhaps the biggest transformation to hit the U.S. intelligence community is under way now. Called the Intelligence Community (IC) Information Technology Enterprise, or ICITE, initiative, it aims to create a common IT workshop for all 16 IC agencies.

*“As we execute this right, we’ll save a lot of money,” Director of National Intelligence James Clapper said as ICITE was kicking off in 2012. “Maybe more importantly, the intelligence community will be able to take intelligence integration to the next level as we transition from individual, agency-centric IT ... to an enterprise model that shares resources and data.”*

**“The ultimate intention of ICITE: an unprecedented level of integration and information-sharing across the IC enterprise with which to create fully formed intelligence products that seamlessly integrate signals, human, cyber, geospatial and other intelligence disciplines along with big data analytics.”**

JAMES CLAPPER  
DIRECTOR OF NATIONAL INTELLIGENCE

The ultimate intention of ICITE: an unprecedented level of integration and information-sharing across the IC enterprise with which to create fully formed intelligence products that seamlessly integrate signals, human, cyber, geospatial and other intelligence disciplines along with big data analytics. The key to accomplishing this is the creation of an intelligence community cloud that relies on open standards and open-source software so agencies are free to rapidly share, integrate and innovate as needed.

That community cloud is actually composed of two distinct clouds: the IC GovCloud, managed by the National Security Agency (NSA) and providing data analytics, storage and computing services; and C2S, built by Amazon Web Services, managed by the Central Intelligence Agency (CIA) and providing infrastructure-as-a-service capabilities for rapid scaling. With these community clouds in place, agencies can concentrate on their core areas of expertise — think National Geospatial-Intelligence Agency and geospatial intelligence, for example — and provide that expertise to their sister agencies.

As agencies connect to the ICITE clouds, they are running their applications and IT activities across two infrastructures — the cloud and their own data centers. This is known as an open hybrid cloud (OHC) arrangement, and it offers big benefits in terms of cost reduction and extreme scalability. But it also carries specific challenges for IT managers across the IC — namely, optimizing and managing those applications to run across both infrastructures seamlessly.

That’s where Red Hat, the world’s leading provider of open-source solutions and a central player in the ICITE effort, comes in. GovLoop sat down with Red Hat’s Toan Do, Director of National Security Programs, and Jason Callaway, Solutions Architecture Team Lead for the IC, to understand how open source platform-as-a-service, cloud management platforms and storage management solutions can assist IC member agencies as they address the challenges of moving to an OHC environment.

This Industry Perspective will provide you with valuable insights and best practices for embracing and optimizing an open hybrid cloud.

# OPEN HYBRID CLOUD: CHALLENGES AND SOLUTIONS

Intelligence agencies are confronting a common set of challenges as they proceed on the ICITE journey: They must migrate their applications and data assets to a community IC cloud so they can be shared with other IC member agencies and deployed at scale when necessary, even as they continue to run them in their own data centers for their own purposes. This open hybrid cloud arrangement offers the benefit of lower costs by sparing an organization the need to build, maintain and manage additional infrastructure to scale up applications when needed. It also offers a nearly unlimited ability to scale up and down as needed.

But an open hybrid cloud presents three common technical challenges to IT managers across the IC. First, they need to optimize their data center-based apps for the cloud. Second, they need to ensure their apps are properly synched up with the appropriate data, no matter where those apps are running. And third, they need to easily monitor and manage their apps as they run in any environment, whether that's a cloud or private data center.

Fortunately, because of the intrinsic benefits that come with open standards and open-source software — namely, flexibility, innovation and a community-based approach to problem-solving — there are solutions to these problems.

Let's walk through each of these challenges:

## Challenge No 1: Preparing Legacy Applications for the Cloud

Applications designed to run in a private data center have to be reconfigured to run in a dynamic and scalable cloud infrastructure. [OpenShift Enterprise 3](#), Red Hat's Platform as a Service offering, does this by harnessing open standards and open-source software — primarily centered on Docker container technology and Google's Kubernetes container-management technology — to quickly develop, package, deploy and scale applications in the cloud. Container technology essentially provides an envelope around an application or microservice software that provides it all of the needed support — code, runtime, system tools and system libraries — to be production-ready in any environment.

*"OpenShift future-proofs your applications when you refactor them for the cloud so they can run in your data center and in any of the clouds that you choose to run them in,"* said Do.

In the case of legacy apps, Callaway said, "It's just a matter of containerizing it, and that's not difficult. We have been doing workshops for IC employees and integrators around the basics, and those are very popular. We've been doing these two to three times a month — there's so much demand for people to learn how to do this. So adopting these industry standards immediately opens up an enormous ecosystem of things that are out-of-the-box compatible with OpenShift."

OpenShift is already installed or will soon be installed at every IC agency, so this capability already exists.

OpenShift is highly mature, supporting more than 2.3 million apps and more than 1 billion page views per day. There are three varieties of OpenShift: an online public PaaS called OpenShift Online; a private, on-premise PaaS called OpenShift Enterprise and an open-source community PaaS called OpenShift Origin.

## Challenge No. 2: Ensuring Your Apps in the Cloud Are Synched Up With the Correct Data – Also Known as Preventing 'Data Lock-in'

When moving an application from the data center to the cloud, it's important that the data storage it relies on also remains accessible and synchronized to that cloud-based app. But data is often stored in proprietary storage systems in the data center, so migrating that data to where it is needed in the cloud is a difficult, if not impossible, process.

The solution is to move from physical-based storage to open-source software-defined storage solutions so your data can follow the app in whatever IT infrastructure it runs in. If your challenge is to provide file-based data support to a legacy app that is being migrated to the cloud, for example, then Red Hat Gluster Storage can help. This scale-out storage platform can aggregate numerous small storage files into a consolidated single Global Namespace for easier deployment on premise or in a public or hybrid cloud. This means that wherever your apps are running, your file storage can remain connected. This is particularly well-suited for such workloads as enterprise virtualization, big data analytics and rich media.

Many IC applications also depend on object and block storage, which are ideal protocols for a modern cloud architecture. But that storage may have special needs because it cannot run on a commercial cloud, such as the Amazon C2S, due to geographical limitations or data sensitivity constraints. In this case, an open-source software-defined storage solution called Red Hat Ceph can provide the same lightning-fast, highly scalable performance found in a commercial cloud, but with the advantage of being able to service regions and data-sensitivity levels that are off limits for C2S or other commercial cloud offerings.

## Challenge No. 3: Seeing and Managing Applications Running in Multiple Infrastructures

When running applications from an on-premise data center, the IC GovCloud, the C2S cloud or another infrastructure, IT operations teams need to be able to monitor and manage those applications and their underlying foundations. A good solution for this is Red Hat CloudForms, an award-winning open-source cloud management platform that provides single-pane-of-glass views of all infrastructure resources and the applications running on them. This provides the agency CIO or IT operations team the ability to look across Amazon, OpenStack, Red Hat, VMWare, Microsoft and other major software infrastructures to see and manage those resources and the applications running on them. CloudForms enables tasks such as workload discovery, event capture, infrastructure monitoring and management and workload provisioning, among others.

## CASE STUDY

# OPEN SOURCE ADVANCES ICITE

At its core, open standards and open-source software are about flexibility, portability, integration and innovation. Ultimately, that's what ICITE is all about as well, which explains why open standards and open-source solutions are fundamentally embedded into the ICITE vision and architecture. For example, OpenShift PaaS has been installed or is being installed at every IC agency and in the ICITE C2S cloud. And Red Hat open-source solutions were among the first to be included on the ICITE blanket purchase agreement in 2004. This should come as no surprise, since Red Hat Enterprise Linux has been the intelligence community's operating system standard for years.

As the ICITE landscape takes form, intelligence agencies will continue applying open source and open-standard technologies in innovative ways to bridge the traditional IC silos that have long hampered the government's ability to connect dots and sift meaningful intelligence from an expanding nebula of data. Do predicts this continuing imperative to innovate will increasingly compel intelligence agencies to move away from proprietary solutions.

"If you make everybody choose a standard that is proprietary, one, you're going to get a lot of pushback, and you're always going to be beholden to that proprietary software package," Do said. "So there's not a lot of innovation that can occur, and you limit the amount of innovation that can occur just due to the limited number of people who know it, who can build further upon it and who can innovate on it. When we look at open source within the IT community, because it's open standards and these standards are well known in the IT community, people can innovate quicker and build better applications based on those standards than if they are using proprietary gear."

One salient example of how the IC values and uses open-standard, open-source technology is Security Enhanced Linux (SELinux), a series of security modifications to the popular Linux operating system (OS) kernel. SELinux was developed and offered to the open-source community by the National Security Agency in conjunction with Red Hat in 2000. SELinux enables the Linux OS — the world's most popular operating system for hardware platforms, including servers, computers and Android smartphones — to support strict security access controls, including the Defense Department's mandatory access controls.

Today, that same technology is being used to make application containers more secure and better able to support multiple tenants, Callaway said.

"We're using SE Linux now to apply those same security access concepts to containers so they can support multiple sensitivity levels and multiple communities of interest, all running on that same Docker host," he said.

This application of SELinux technology to PaaS containers was an unintended consequence of the development work that went into SELinux at the time, but that illustrates how powerful open standards and open-source software can be in driving continuous innovation, he said.

"That's something that you wouldn't get outside of the Red Hat ecosystem. SELinux was a collaborative effort with the intelligence community that has gone back into industry and is helping industry. And now there's this feedback loop where it's ending up back at the IC again."

## CASE STUDY

# LEVERAGING COMMERCIAL BEST PRACTICES IN C2S

When the C2S Program Office was looking to leverage commercial best practices they didn't need to look very far. After extensive review of commercial offerings, Red Hat was awarded a contract to install a private instance of OpenShift Online on C2S. IC developers can leverage the same technology that powers 2.3 million applications in the commercial space but now offered in a private high-side instance.

"Red Hat OpenShift on C2S will finally give the developers the tools used by their commercial counterparts. This contract award enables the IC community to leverage the best in breed technologies from Red Hat and Amazon C2S to power the IC applications," said Toan.



# BEST PRACTICES FOR MOVING TO THE ICITE CLOUD

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Do and Callaway suggest a few fundamental steps you should take as you move to the C2S or IC GovCloud environment.



**Prepping your apps.** Make sure your applications have been decomposed into their micro-services — that is, their smallest functional components; for example, the search bar on a website — so you can more easily and smartly reconfigure them for the scalability of the cloud. Make sure your apps are containerized and ready to deploy in any infrastructure. And make sure they have been refactored to leverage the biggest benefits of the cloud: horizontal scalability and resource efficiency.



**Pushing app changes often.** One of the big benefits of breaking down your apps into micro-services is that the development-test-production cycle can accelerate. And because you are pushing out tiny functional chunks of an application at a time — instead of the entire application — the consequences of a less-than-perfect rollout are far less impactful.



**Reviewing your IT fundamentals.** The cloud is an utterly different beast than your data center and your IT architecture, and strategy should reflect that. “If you’re treating the cloud like a tech refresh, you’re doing it wrong,” said Callaway.



**Tailoring the best data storage model for each app.** Not all apps are equal when it comes to data storage. If it’s a new app, go with object-based storage and let the cloud infrastructure figure out how to synch up your app with its data as the app scales out. But if the app requires a huge filesystem data store, which is not a very cloud-friendly protocol, then find a good open-source solution that can glue together many small filesystems into a single global namespace — like Red Hat Gluster — so that app can more easily migrate to the cloud. You could also choose to refactor that app for object storage, but that would take much longer and cost more.

## CONCLUSION

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In the end, ICITE — built on a foundation of standards-based open-source technologies — will mean a more nimble, efficient and innovative state of being for intelligence agencies. Agencies will be able to focus on their core areas of expertise and leverage economies of scale by sharing that expertise as a service to other IC agencies. Applications will be developed and deployed faster — more akin to an assembly line model than a custom craftwork model — and benefit the entire IC, not just a single agency. Data and workloads will be far more portable. Various disciplines of intelligence will be more easily integrated to fill intelligence gaps and reveal more “unknown unknowns.” Agencies will be incentivized to move away

from proprietary software, freeing them from being locked in to particular products and enabling them to connect more easily to shared services and deploy more innovative tools.

Two critical enablers of this success are the open hybrid cloud approach, which gives IC agencies increased flexibility as they transition to ICITE, and open-source PaaS, which enables agencies to quickly and cheaply develop and deploy applications in the cloud.

# ABOUT RED HAT

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Red Hat® is the world's leading provider of open source solutions, using a community-powered approach to provide reliable and high-performing cloud, virtualization, storage, Linux®, and middleware technologies. Today, Red Hat is at the forefront of open source software development for enterprise IT, with a broad portfolio of products and services for commercial markets. That vision for developing better software is a reality, as CIOs and IT departments around the world rely on Red Hat to deliver solutions that meet their business needs. Solutions that provide technology leadership, performance, security, and unmatched value to more than 90% of Fortune 500 companies.



# ABOUT GOVLOOP

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GovLoop's mission is to "connect government to improve government." We aim to inspire public-sector professionals by serving as the knowledge network for government. GovLoop connects more than 200,000 members, fostering cross-government collaboration, solving common problems and advancing government careers. GovLoop is headquartered in Washington, D.C., with a team of dedicated professionals who share a commitment to connect and improve government.

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