

Edge computing for the Department of Defense

Overmatch near-peer adversaries with AI decision advantage

Edge is not one place

Data is produced at the edges of the network, and moving processing closer accelerates situational awareness and decision-making. To a naval carrier group, the edge might be a landing craft carrying Marine Corps vehicles to shore. When those vehicles enter the battlespace, the edge moves with the forward line of troops. Beyond that is the electronic warfare edge within adversarial space.

Tactical edge for hybrid cloud

In denied, disrupted, interrupted, and limited (DDIL) environments, the ability to share applications, data, and compute resources across the tactical edge enables warfighters to take advantage of a software-defined architecture. Geographically distributed compute resources act as a single cloud-enabled compute resource. Application and infrastructure components work in concert to create a common data plane.



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The path to all-domain operations

Pursuing a campaign against near-peer and peer adversaries requires information dominance and decision advantage. To that end, the Department of Defense (DoD) is adopting a multidomain operations (MDO)-focused [Joint All-Domain Command and Control \(JADC2\)](#) framework to share sensor data across land, air, sea, space, and cyberspace forces. Information captured at the edge helps the DoD get inside the enemy's observe-orient-decide-act (OODA) loop to make better decisions, faster.

To meet JADC2 objectives, the DoD needs speed, stability, and scale at the edge. Requirements include:

- **Gaining information advantage by pushing decision-making to the edge.** Transmitting data from the tactical edge up echelon for processing introduces too much lag. By the time actionable intelligence is sent back to the edge, decisions may be overcome by events (OBE). Information advantage requires decision-making at the speed of action—at the edge. See sidebar, “Edge is not one place.”
- **Providing uninterrupted data availability.** Many tactical computers are customized for a single purpose. If one of two computers on a tank is destroyed, for instance, the other cannot take over its functions. To maintain decision advantage, the joint forces need the ability to quickly recompose mission capabilities on any computer.
- **Shortening the OODA loop.** The idea is to move more quickly than the adversary, making better decisions faster. Today, most warfighting platforms cannot share data. This causes delays, confusion, and the opportunity for error. Warfighters can close the OODA loop faster with a [Modular Open Systems Approach \(MOSA\)](#) to edge computing and data science.
- **Sharing artificial intelligence and machine learning (AI/ML) capabilities across forces.** Today, each combat system and mission application program office develops bespoke software capabilities, leading to noninteroperable and duplicate applications. An interface for sharing capabilities like machine-learning models and AI algorithms—without disclosing other intellectual property—will help the joint forces achieve decision advantage.

Build once, deploy anywhere, for any echelon

With a modern, container-based application platform, the joint forces can build applications once, deploy them at any edge location (forward operating base, vehicle, semiautonomous weapon system, etc.), and freely migrate workloads to other hardware when needed. Each Linux® container holds one or more discrete mission capabilities and all of their dependencies, enabling the container to run on various platforms, including commodity x86 hardware. Advantages of a container platform for MDO-focused JADC2 include:

Mission resiliency and survivability. All computers on an edge asset like a ship or tank form a microcloud. If one computer fails, the team can quickly recompose the mission capability on another. (See sidebar, “Tactical edge for hybrid cloud.”)

Red Hat solutions for edge computing

[Red Hat Enterprise Linux](#) and [Red Hat Enterprise Linux for edge computing](#)

[Red Hat OpenShift Container Platform](#)

[Red Hat CodeReady Containers](#)

[Red Hat Ceph® Storage](#)

[Red Hat Ansible® Automation Platform](#)

[Red Hat Integration](#)

Compliance with DoD security standards

Red Hat OpenShift has multiple layers of federally certified security hardening, including FIPS 140-2 validated crypto and Common Criteria certified platforms. Red Hat technology aligns with the DoD Enterprise DevSecOps Reference Design (DEDSORD).



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Data interoperability. Using integration technologies, the DoD can push newly acquired information to other systems at the speed of action, without relying on manual entry. This enables the joint forces to quickly disseminate information up echelon—from battalion to brigade, all the way to the Pentagon—to create a common operational picture.

Cost containment. Containers support the MDO and JADC2 objectives to create an integrated warfighting capability by integrating *existing* systems. Hardware doesn't need to be ripped and replaced. Legacy applications don't need to be rewritten because they can be containerized and run on the same platform as modern, microservices-based applications.

Mission agility. When AI/ML applications are built from microservices, DoD developers can adapt quickly to change by disintegrating and then recomposing microservices—for example, to ingest data from a new type of sensor.

Why Red Hat for the edge

Adopting edge computing for all-domain decision advantage requires the right technology and cultural change. Red Hat can help with both.

[Red Hat® OpenShift® Container Platform](#) helps DoD forces build applications once and deploy them anywhere, for any echelon. Red Hat OpenShift focuses on security at every level of the container stack. (See sidebar, "Compliance with DoD security standards.") Use [Red Hat Integration](#) technologies to adapt to inevitable changes in data formats and protocols, bringing together data from past, present, and future systems.

Red Hat is also uniquely positioned to guide DoD teams through cultural change as they adopt a hybrid cloud platform and new DevSecOps processes. We understand how to bring together ideas from a community that is as complex and diverse as the DoD because that's our business model: distilling the best ideas from upstream communities into focused solutions.

For more information, check out [Red Hat's edge computing solutions](#).

About Red Hat

Red Hat is the world's leading provider of enterprise open source software solutions, using a community-powered approach to deliver reliable and high-performing Linux, hybrid cloud, container, and Kubernetes technologies. Red Hat helps customers integrate new and existing IT applications, develop cloud-native applications, standardize on our industry-leading operating system, and automate, secure, and manage complex environments. Award-winning support, training, and consulting services make Red Hat a trusted adviser to the Fortune 500. As a strategic partner to cloud providers, system integrators, application vendors, customers, and open source communities, Red Hat can help organizations prepare for the digital future.

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