Deliberate engineering of Joint All-Domain Command and Control

Quick reference guide

Joint All-Domain Command and Control (JADC2)
An approach to redefining and accelerating command and control architectures across all US and coalition military services and domains

Advanced Battle Management System (ABMS)
The US Air Force's component of JADC2, intended to modernize and accelerate all aspects of Air Force and joint warfighting operations

Project Convergence
The US Army's component of JADC2, a forward-thinking and comprehensive approach toward unifying and standardizing joint warfighting training, development, and operations across all domains

Project Overmatch
The US Navy's component of JADC2, a new command & control network designed to link aircraft, submarines, surface ships, and all-domain sensors together

All-Domain Operations
The strategy of integrating and coordinating command and control operations simultaneously across air, land, sea, space, cyber, and electromagnetic spectrum domains

Joint All-Domain Command and Control (JADC2) is an ambitious and necessary effort to modernize and adapt warfighting capabilities to counter near-peer adversaries in the great-power competition of our future, while simultaneously fighting the challenges and adversaries of today. All branches of the United States military are pursuing this effort that involves changes to military doctrine, joint force strategy, relationships between the US and coalition forces, and industry partnerships.

JADC2's success is reliant on a rapidly evolving, dynamic, software-enabled, data-driven technological evolution across the all-domain battlespace. This technological evolution must be deliberately engineered to provide the agility and interoperability needed to meet and exceed the current and future demands of warfare. Red Hat is proud to be a dedicated DoD mission partner and brings security-focused, enterprise open source technology and domain expertise to bear on this challenge. Red Hat's experience building globally distributed, reliable, and durable architectures across government, healthcare, financial, and telecommunication industries can help with the challenges of JADC2.

The capabilities required to better secure the technologies, applications, and data involved in JADC2 must be inherent, pervasive, and proven throughout the entire architecture. This security focus is a defining characteristic of the entire Red Hat portfolio, starting from Red Hat® Enterprise Linux® and continuing through the Red Hat OpenShift® Container Platform and Red Hat Application and Data Services, critical components of a comprehensive JADC2 approach.

These components become even more relevant as JADC2 continues to evolve and reveal its complexities. Military stakeholders have begun exploring modular approaches to JADC2, rather than trying to build every kill-chain and C2 pathway *a priori*. Discrete and interoperable *recomposable capabilities* can be built to provide just-in-time offensive/defensive capabilities to counter unpredicted adversarial dilemmas. To achieve this level of modularity and dynamism across all domains, there are three characteristics of modern systems architectures that will help evolve the blueprint for JADC2:

Open hybrid cloud infrastructure

The modern all-domain battlespace is defined by its heterogeneity, especially its digital infrastructure, which includes edge assets, public/private clouds, embedded weapon systems software, and IoT. Red Hat's enterprise open-source portfolio provides a consistent, security-focused foundation across this diverse technological landscape, giving warfighters the ability to accurately build, deploy, and scale dynamic applications that align to their current and future missions. The applications and data that will play critical roles in JADC2 will depend on modern infrastructure and enterprise automation to support this *dynamic consistency* that a successful implementation of JADC2 will need to overmatch the adversary.

Fast, modern communication methods are foundational to the future of warfare, and 5G, with its support for vast numbers of connected entities and high throughput, has emerged as a prime candidate for the communications backbone of a future military IoT dominated by large numbers of autonomous, attritable/disposable assets. Red Hat's extensive experience with modern telecommunication architectures for 5G enables this capability to be a strategic component of an open hybrid cloud infrastructure.

Recomposable capabilities
Modular, interoperable warfighting capabilities, which can be rapidly assembled or recomposed into novel kill-chains/kill-webs, providing the agility and flexibility to combat unpredictable adversarial strategies/capabilities

Mosaic warfare
A forward-thinking joint force design and operations concept that emphasizes the use of lightweight, recomposable warfighting capabilities, which can be dynamically assembled into fast, agile, and flexible kill-webs to defeat the challenges presented by near-peer adversaries

Application containers and microservices
Technology and digital architecture designed for maximum flexibility and scalability of software application and services deployed across a hybrid infrastructure

Open hybrid cloud
An agile digital architecture based on open source technology and standards, providing consistent infrastructure, application, and data management/integration capabilities across a heterogeneous IT infrastructure, public/private cloud, on-premise, tactical edge, and IoT

Data-centric design and data gravity
An acknowledgement that software applications and services must be designed in alignment with the data they produce/consume, and when architected correctly, the weight (gravity) of that data should not hinder their scalability and agility

Modern application architectures

With the rapidly compressing timescales of modern warfare, the software needed to support the breadth and scale of JADC2 must be created, deployed, and scaled faster. The Red Hat ecosystem built around OpenShift Container Platform is purpose-built to enable the DevSecOps workflows that the DoD has embraced for software development/deployment. Hardened application containers have become the standard for deploying both traditional and AI/ML applications, and natively enable the *build once, deploy many* approach, aligning to the distributed and dynamic demands of JADC2. Additionally, containers are foundational for building microservices-based architectures, which align to the concepts of *recomposable capabilities* and *mosaic warfare* force design concepts, which may play critical roles in architecting JADC2.

Data-centric architectures and integration

JADC2 is fundamentally a data challenge, with command and control rapidly becoming a digital-native exercise due to software-dependent weapon systems, increasing volume, variety, velocity, and value of decisioning data, and blurred lines between cyber and kinetic domains. The right data must be consumed at the right speed from the right producers and presented to the right people to achieve decision dominance. Information dominance is no longer enough; data and decision-making speed are the new strategic assets, and critical applications such as AI/ML workloads are only valuable when trained with the right data and executed against relevant and timely mission data.

Software applications exist to produce and consume data, and their infrastructure must inherently enable low-friction data exchange and interoperability. Red Hat Data Integration enables an agile and durable fabric to allow modern and legacy applications to more securely exchange data, interact with well-managed APIs, and synchronize data even under D/DIL conditions.

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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