Booz | Allen | Hamilton

Advancing the Tactical Edge with K3s and SUSE RGS

Industry and Location
Technology | United States

Product and Service
K3s

Success Story

At-a-Glance

As a premier digital integrator for the U.S. Department of Defense, Booz Allen Hamilton delivers technology solutions that give warfighters the information edge on the battlefield. Capitalizing on open source solutions like K3s, Booz Allen's SmartEdge solution allows battalions to make real-time, data-driven decisions which dramatically improve operational outcomes and increase the probability of mission success.

Introducing Booz Allen Hamilton

Booz Allen Hamilton is one of a growing cohort of organizations working in association with the U.S. Department of Defense to drive open source innovation into strategic defense initiatives. The company is delivering technology solutions that give warfighters the information edge on the battlefield. Booz Allen is transforming military operations in complex and remote locations with the use of groundbreaking technologies, to enable decision-making at the point of data collection.

Fast, insight-driven decision-making in highly dynamic and dangerous conditions is, more often than not, the difference between life and death. Booz Allen's innovative edge computing solution, SmartEdge, addresses the increasing need to gather data in real time and perform analysis at the point of collection, supplying immediate insight which results in faster decision-making in pressurized, inhospitable

environments such as battlefields. The analytics enabled and performed by SmartEdge allow battalions to make real-time, data-driven decisions which dramatically improve operational outcomes and increase the probability of mission success.

For John Pisano, Ki Lee and Ben Reif, leaders within Booz Allen's digital solutions business, the focus has been to address this challenge with the development of Smart-Edge, a decentralized approach that goes beyond data collection to data processing and analytics, delivering insight and prompting immediate action.

Ki Lee, vice president of digital solutions at Booz Allen Hamilton, perfectly summarizes the impact of SmartEdge on the modern battlefield, "At the tactical edge, time is a weapon. With edge computing and processing at the point of data collection, we will give warfighters access to real-time, data-driven insights so they can act at the speed of the mission. SmartEdge makes this possible at scale with an extensible platform utilizing open architecture principles and open source technologies."

> "K3s has been a foundational piece—giving us the automated cloud to edge DevSecOps capability we needed. It allows us to do updates with different deployment strategies and operate our edge devices in a clustered fashion. It really does support distributed processing across devices."

Ben Reif
Lead Developer
Booz Allen Hamilton

Working in collaboration with Brandon Gulla, Tim Nicklas, Chris Nuber and the team at SUSE Rancher Government Services (SUSE RGS, formerly Rancher Federal), the Booz Allen team is underpinning its smart, tactical edge platform with K3s, the fully certified CNCF (Cloud Native Computing Foundation) Kubernetes offering. K3s is a super-lightweight Kubernetes distribution, designed for production workloads in unattended, resource constrained, remote environments.

This is the story of how, alongside the team at SUSE RGS, Booz Allen is delivering real tactical advantage to its clients with Kubernetes and K3s.

The Journey to SUSE RGS and K3s

When looking at today's connected environment, what is striking is the proliferation of IoT and edge devices. This increase, both in the volume of devices, sensors and connections (and the data generated by these elements), is driving a natural shift toward edge operations. Booz Allen and SUSE RGS

are at the vanguard of innovation in this space.

Booz Allen has been part of the open source community for many years. The firm is a key contributor to Jenkins and Cray OS projects (and the plugins that enable these). It is also a core member of, and contributor to, the CNCF Foundation. Unsurprisingly then, when designing the SmartEdge infrastructure, containers and Kubernetes were part of the plan from the start.

The team began experimenting with Kubernetes and early versions of Docker in 2015. They soon became familiar with Kubernetes' value as a mechanism to move away from outdated and monolithic compute methodologies. The digital solutions group at Booz Allen quickly recognized Kubernetes' ability to drive a more agile, cloud native and microservices-centric strategy, in solving the most complex of infrastructure management challenges.

When it came to Kubernetes management, the team trialed a number of options.

> "Based on the open architecture and the modularity, our intent here is to create an ecosystem of capabilities, of infrastructure that we can plug and play, so that we can orchestrate to mission-specific requirements—K3s makes this possible."

Ki Lee
Vice President
Booz Allen Hamilton

Location Confirmed

KubeEdge and K3s seemed the most natural starting point, given the device-centric use case. After assessing other leading Kubernetes distributions, it was clear that many stayed focused on the Cloud and had no clear strategy for edge deployments. The team liked KubeEdge, but with the profile of its customers front-of-mind Booz Allen wanted to work with a company with a solid U.S. presence.

K3s was soon identified as the right solution, due to its small footprint, streamlined

distribution and relevance to the digital solutions team's particular needs. The relationship with SUSE RGS was the natural next step, and in 2018, K3s was deployed by the Booz Allen team.

Ben Reif, lead developer at Booz Allen Hamilton, was quick to emphasize that, "K3s has been a foundational piece—giving us the automated cloud to edge DevSecOps capability we needed. It allows us to do updates with different deployment strategies and operate our edge devices in a clustered fashion. It really does support distributed processing across devices."

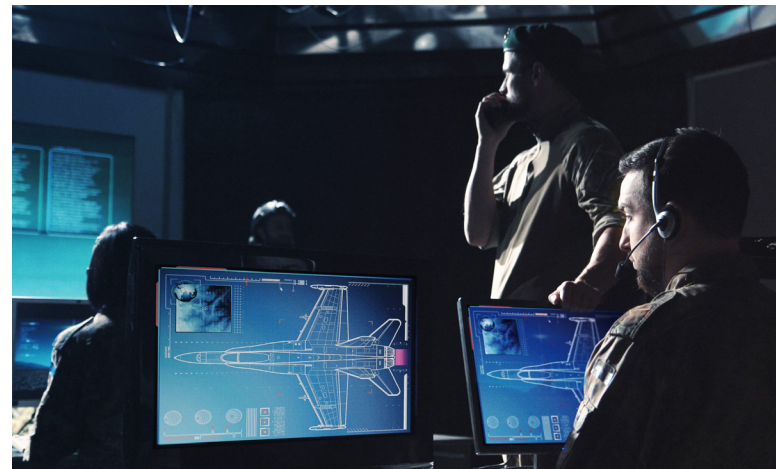**Pioneering a New Frontier in Military Tactics**

As the innovation team at Booz Allen have come to understand, many organizations continue to operate outdated data processing methodologies—struggling to capitalize on the opportunity the edge represents. This has resulted in a widening gap between data capture and decision-making.

> "When we think of the tactical edge, we think of the soldier, the first responder, and the kit they wear and carry. Our focus is on creating highly sensitive and effective systems that enable teams to do their jobs quicker and more efficiently."
>
> **John Pisano**
> Principal
> Booz Allen Hamilton

The industry is accustomed to thinking about the edge as an enterprise IT term—the edge of the data center, or remote access capabilities. For Booz Allen, the edge means the far, tactical edge—in the thick of the action where quick thinking could mean the difference between mission success or failure. Their team of technologists have, therefore, looked at how edge technologies like K3s can be used to close the gap between data collection and action.

Comprised of fixed cloud, tactical cloud and tactical edge infrastructure, Smart-Edge is a completely hardware-agnostic and heterogeneous solution. It was developed in recognition of the diverse range of hardware in the field—a project might run in AWS, Azure or GCP (or a mixture), and so the SmartEdge infrastructure had to support multiple architectures in a variety of flavors. In contrast to commodity, cloud-based resources, the focus was on building minimal streamlined container images in multiple flavors. Why? In designing the architecture and the DevSecOps pipeline estate, having a variety of container images would support multiple specific architectures. This is where K3s comes in—helping the team ex-

ecute in a range of environments, where a range of different hardware is used.

But what does this mean from an operational point of view? How do soldiers in theatres of war benefit from this innovation?

Driving Insight at the Tactical Edge
Things move very fast in the fog of war. Battlefields are constantly changing, and an enabler like SmartEdge allows an individual to serve as a force multiplier. Historically, as a soldier on military patrol searching for high value targets, the emphasis would be on preparation—training or pre-briefings

based on existing intelligence gathered in advance. Logistically, this requires high levels of coordination, or intelligence can be compromised and quickly become outdated.

John Pisano, principal at Booz Allen Hamilton, explains, "When we think of the tactical edge, we think of the soldier, the first responder, and the kit they wear and carry. Our focus is on creating highly sensitive and effective systems that enable teams to do their jobs quicker and more efficiently."

An array of embedded sensors perform a variety of distinct functions, gathering data in real time and performing analysis at the point of collection. Whether it's a camera scanning the environment or biometrics that are tracking the state of an individual's health, all these sensors capture and process data locally, supplying immediate insight which results in faster decision-making.

Pisano continues: "By putting processing power directly into operational kit, we can connect teams and allow collective consciousness in the field. Not only can I check my heart rate, I can check yours too, look after my team better, adjust my tactics according to environmental and physical factors. This drives better outcomes."

Historically, to confirm a team has received the same information, a soldier would have to relay a question via radio and wait for a response from each operative. Having processing power at the tactical edge automates this confirmation not only for the individual soldier but across an entire, connected squad. SmartEdge aggregates the experience to put insight in the hands of everyone, at the same time.

This is critical not only in terms of monitoring health but, crucially, delivers insight at the moment information is most needed. As soldiers move through an area, if by chance a camera picks up an object or person of interest, it can home in and detect the nature of that object. Connected sensors will not only alert the individual but the entire group.

This early consolidation of information allows entire battalions to strategize on-the-fly—all that processing happens as the camera captures the image. It is scanning, detecting and acting on this insight instantly. This is in sharp contrast to earlier methods in which data was passed via an operations center, by which time the target may have moved or the environment altered. Outcomes have been transformed as a result.

What's Next

For the team, the priority is to deploy SmartEdge in as many scenarios as possible, where it can make a real and tangible difference. From an innovation point-of-view, the digital solutions business is seeing the impact of SmartEdge on the evolution of the device landscape. According to the team, Booz Allen's clients can use a range of devices as the software knows how to talk to an array of sensors. If users want to lift and drop software on a Raspberry Pi, or Nvidia Jetson, they can. K3s allows this kind

of portability which is ushering in a new horizon of possibilities for the firm's clients.

Ki Lee, vice president, Booz Allen Hamilton concludes, "Based on the open architecture and the modularity, our intent here is to create an ecosystem of capabilities, of infrastructure that we can plug and play, so that we can orchestrate to mission-specific requirements—K3s makes this possible."

Timeline

- 2015: started early experimentation with containers and Docker.
- 2015: discovered Kubernetes through CNCF alliance.
- 2018: began working with SUSE RGS and K3s to underpin smart edge strategy.
- Present: Booz Allen rolling out smart edge in a range of use cases.

Benefits

- Highly portable, containerized infrastructure, capable of running on any device in any environment.
- Removal of the gap between data capture and insight delivery.
- 80% reduction in time-to-insight; from hours to seconds.

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