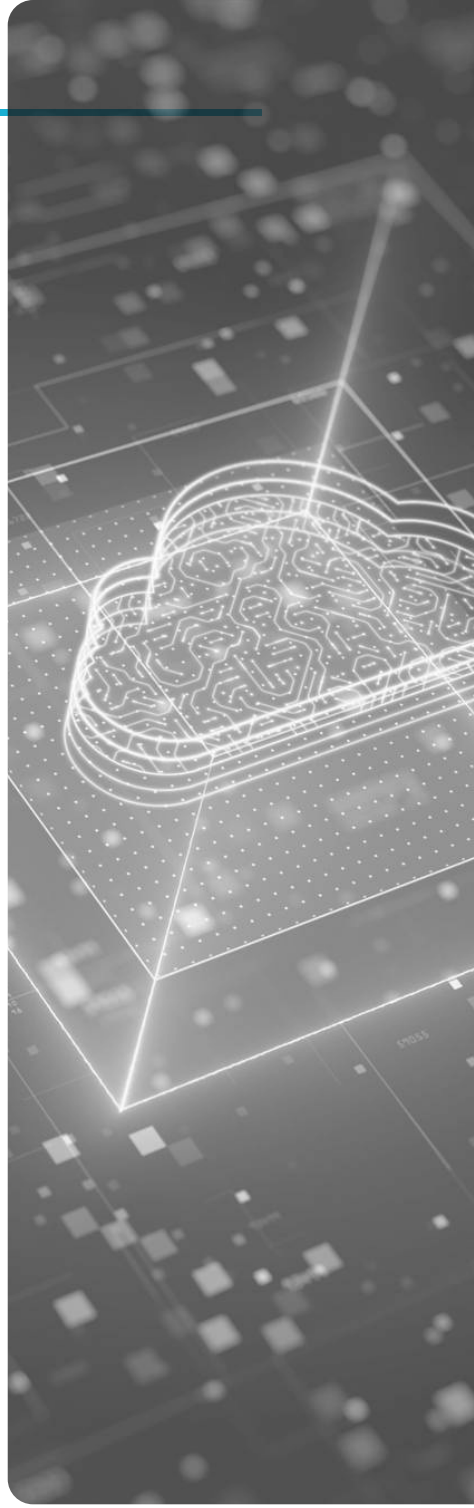
Best Practices for Optimizing Cloud Security with DevSecOps

Whitepaper

2024

AGILEBLUE

Overview of DevSecOps



DevSecOps, short for Development, Security, and Operations, is an approach to software development that integrates security practices directly into the DevOps workflow. Traditionally, security was treated as a separate function that occurred after development and operations were complete, which often led to delayed releases and the discovery of vulnerabilities late in the process. DevSecOps shifts this paradigm by embedding security into every stage of the software development lifecycle, from initial design to testing, deployment, and ongoing maintenance. This strategy ensures that security vulnerabilities are identified and addressed early, minimizing risks and costs associated with fixing issues later in the development process.

The DevSecOps model emphasizes automation, collaboration, and continuous monitoring to ensure that security is a core component of software delivery. By automating security tasks such as code scanning, vulnerability detection, and compliance checks, DevSecOps teams can maintain high security standards without slowing down the speed of development.

How Cloud Security Fits in

The intersection of cloud security and DevSecOps represents a critical evolution in how organizations secure their infrastructure and applications. As businesses increasingly adopt cloud services, the complexity of managing security across dynamic, multi-cloud environments has grown. Cloud security focuses on protecting data, applications, and infrastructure in cloud environments, while DevSecOps emphasizes integrating security into every phase of the development lifecycle.

The DevSecOps market size is projected to reach **$41.66 billion** by 2030, growing at a CAGR of 30.76% from 2022 to 2030.

VMR, 2024

Together, they ensure that security controls are not only applied at the cloud infrastructure level but also embedded into the development pipeline. This approach enables teams to automatically enforce security policies, detect misconfigurations, and manage vulnerabilities in real-time, even as cloud environments scale or change dynamically. This fusion allows for the continuous assessment of cloud assets, ensuring that every change made to the infrastructure or application is vetted for security. .

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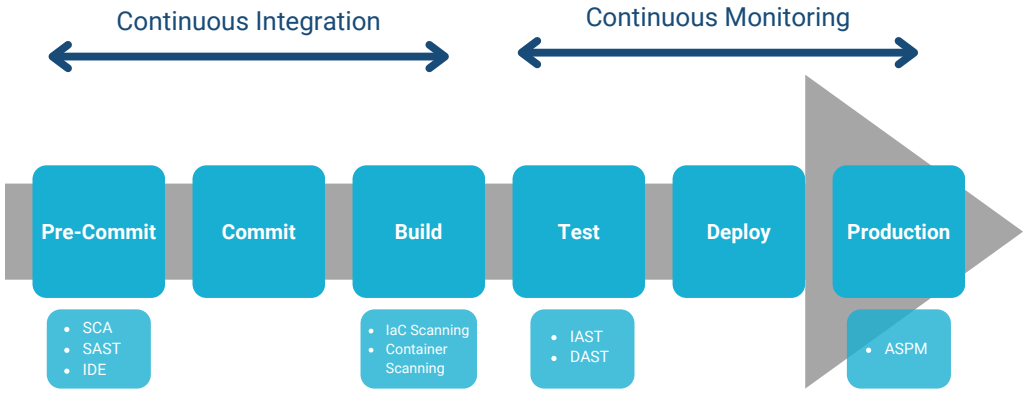
Integrating cloud security within the DevSecOps framework requires the use of automated tools and practices that align with the unique challenges of cloud-native applications. These tools, such as Infrastructure as Code (IaC) scanners and Cloud Security Posture Management (CSPM), help identify risks and enforce compliance across cloud environments. In a cloud context, where continuous deployment is the norm, this alignment ensures that security is an ongoing, proactive process. The combination of DevSecOps and cloud security allows organizations to not only keep up with the rapid pace of cloud innovation but also to maintain strong security postures.

Incorporating cloud security into the DevSecOps workflow isn't just about adding security checks—it's about rethinking how security fits into the entire development process from start to finish. Cloud environments are inherently dynamic, with infrastructure, applications, and services constantly evolving, which makes traditional security methods obsolete. For organizations striving to maintain strong cloud security postures while accelerating delivery, these best practices provide the roadmap for securely developing, deploying, and scaling applications in the cloud. Each step strengthens the overall resilience of systems and enables teams to address vulnerabilities continuously, rather than reacting to them when it's too late.

Shift Security Left: Secure the CI/CD Pipeline



Shifting security left in the DevSecOps lifecycle means incorporating security measures at the earliest stages of development, rather than addressing them later in the process. This proactive approach ensures that security vulnerabilities are identified and mitigated early, reducing the risk of deploying insecure code or infrastructure. To achieve this, security tools and practices need to be embedded directly into the Continuous Integration/Continuous Deployment (CI/CD) pipeline. This automation allows for continuous monitoring and testing, ensuring that security is treated as an integral part of the development process.

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Comprehensive Security Testing for DevSecOps Pipelines

Use Static Application Security Testing (SAST) Tools

- Integrate **SAST** tools early in the development cycle to perform static code analysis. These tools scan source code for vulnerabilities such as buffer overflows, unsafe input handling, and hardcoded credentials. By detecting vulnerabilities during the coding phase, developers can fix issues before they become more difficult and expensive to resolve. SAST tools provide instant feedback on insecure code, preventing common vulnerabilities like injection from being committed to the code repository.

Leverage Dynamic Application Security Testing (DAST)

- While SAST scans static code, **DAST** tools are designed to test the application in a running state. These tools simulate real-world attacks against the application, identifying vulnerabilities like insecure API endpoints, misconfigured authentication systems, and input validation flaws. DAST tools can be integrated into the testing phase of the CI/CD pipeline to provide ongoing runtime security validation, particularly for vulnerabilities that may not be detectable at the source code level, such as authentication failures.

Adopt Infrastructure as Code (IaC) Scanning

- Many cloud environments are provisioned using Infrastructure as Code (IaC) tools. These templates can be a source of security vulnerabilities if not properly configured. Integrating IaC scanning tools into the pipeline ensures that security policies are enforced on cloud configurations. These tools identify issues such as open ports, unencrypted storage, and overly permissive IAM roles before infrastructure is deployed. IaC scanners prevent infrastructure vulnerabilities from entering codified environments, ensuring that critical configurations like access controls are properly enforced.

Software Composition Analysis (SCA) for Library Vulnerabilities

- Many modern applications rely on third-party and open-source libraries, which can introduce security vulnerabilities. SCA tools automatically detect vulnerabilities in these libraries as developers import code from open-source or commercial vendors. By scanning code dependencies, SCA tools provide real-time alerts on known vulnerabilities, reducing the risk of deploying insecure libraries that could expose the system to supply chain attacks.

Automate Container Scanning

- With the widespread use of containers in cloud-native applications, scanning container images is critical to ensuring that operating system libraries and dependencies within the containers are secure. Tools such as Trivy, Aqua Security, and Clair can be integrated into the pipeline to scan container images for known vulnerabilities in OS-level libraries and application dependencies, mitigating risks before containers are pushed to production.

Incorporate Interactive Application Security Testing (IAST)

- IAST tools combine elements of both SAST and DAST by analyzing running applications and detecting vulnerabilities during the actual execution of code. This is particularly useful in identifying issues that may not be easily found by SAST or DAST alone, such as complex input validation errors or multi-layered security misconfigurations.

36% of businesses currently develop software using DevSecOps, compared with **only 27% in 2020.**

GitLab, 2021

Application Security Posture Management (ASPM)

- ASPM tools provide real-time visibility into application security postures once applications are deployed in production environments. These tools monitor for vulnerabilities, misconfigurations, and risks continuously and ensure that security policies are being followed across the application lifecycle, providing a final layer of security to detect issues in live applications.

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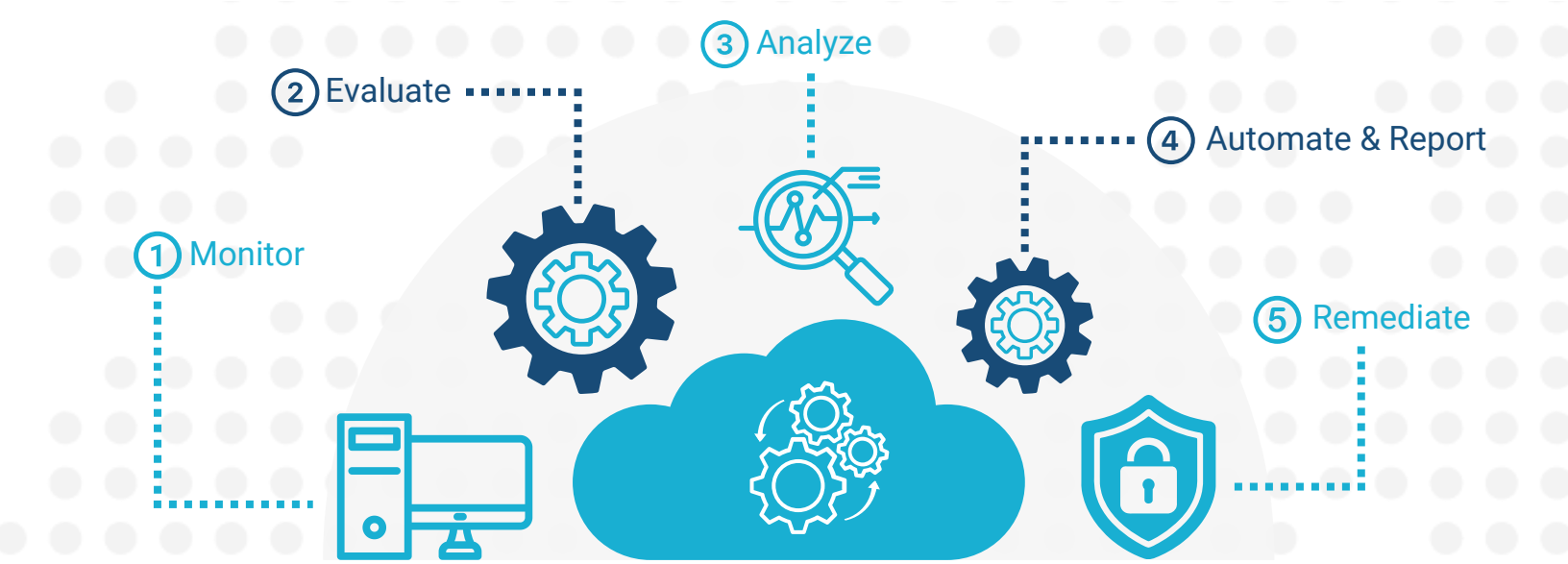
By embedding these tools into the CI/CD pipeline, security checks become a seamless part of the development process. This proactive approach ensures that security is continuously monitored and addressed, significantly reducing the likelihood of vulnerabilities slipping into production.

The combined use of SAST, DAST, IaC scanning, SCA, container scanning, IAST, and ASPM tools empowers organizations to maintain a strong security posture from the moment development begins through deployment and into the production environment.

Automate Security for Cloud Infrastructure

Cloud infrastructure is dynamic, which poses significant challenges for maintaining consistent security policies and configurations. Automating security for cloud infrastructure is essential in a DevSecOps environment to ensure that security practices are consistently applied across development, testing, and production environments. By integrating security automation into the CI/CD pipeline, organizations can continuously enforce security policies, detect vulnerabilities, and ensure compliance with industry standards. This reduces the risk of human error and enables rapid response to security threats as infrastructure scales.



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Key steps for automating security for cloud infrastructure include:

Automate Cloud Security Posture Management (CSPM)

- CSPM tools continuously monitor cloud environments for misconfigurations, vulnerabilities, and compliance violations. These tools provide real-time alerts when insecure configurations, such as open storage buckets or over-permissive IAM roles, are detected. CSPM tools can also be configured to automatically remediate certain issues, such as enabling encryption for storage services or ensuring that multi-factor authentication (MFA) is enabled for administrative accounts. By automating these security checks, organizations can enforce security policies at scale and maintain compliance with regulations like GDPR, SOC 2, and HIPAA.

Integrate Infrastructure as Code (IaC) Security into Pipelines

- As organizations increasingly use IaC tools to provision cloud infrastructure, it's essential to integrate security checks for these configurations into the CI/CD pipeline. Tools can scan IaC templates for common security vulnerabilities before deployment. These scanners detect issues such as overly permissive network configurations, exposed ports, and improperly configured access controls. By automating IaC scanning, DevSecOps teams can prevent insecure infrastructure from being deployed and ensure that all resources are provisioned according to security best practices.

Automate Network Security Configurations

- Cloud environments require dynamic network configurations that can change frequently as services scale and evolve. To ensure that network security is not compromised, network security groups (NSGs) and virtual private cloud (VPC) configurations must be continuously monitored and automated. Certain tools can help automate the enforcement of network security policies, such as ensuring that only approved IP ranges have access to specific services, or that firewall rules are configured to block unauthorized traffic. Automating network security also includes monitoring ingress and egress traffic for anomalies, which can indicate potential security threats.

Container and Kubernetes Security Automation

- Cloud-native applications often rely on containers and orchestration platforms like Kubernetes, which introduce their own set of security challenges. Container scanning tools can be integrated into the CI/CD pipeline to scan container images for vulnerabilities in both the base image and application dependencies. Additionally, Kubernetes security tools like can automate security checks for Kubernetes clusters, ensuring that containers are isolated, Kubernetes RBAC policies are properly enforced, and network policies prevent unnecessary communication between pods. Automated monitoring tools can also detect configuration drift in Kubernetes clusters, ensuring that security policies are continuously enforced as workloads scale.

Continuous Compliance Automation

- Ensuring continuous compliance with security standards and regulatory frameworks is critical in cloud environments, where infrastructure changes frequently. Compliance automation tools automatically check cloud configurations against predefined regulatory policies such as SOC 2, PCI DSS, or CIS benchmarks. These tools can be integrated into the CI/CD pipeline to enforce compliance at every stage of infrastructure deployment, ensuring that all resources meet security and compliance requirements before they are provisioned. Automating compliance checks reduces the time and effort needed for security audits and provides real-time assurance that cloud environments remain compliant.

96% of businesses said their organization would benefit from automating security and compliance processes.

DevOps, 2021

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Empowering Cloud Security with AI-Driven DevSecOps

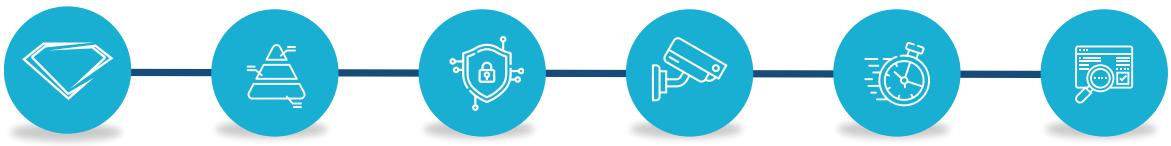
As organizations increasingly rely on cloud services, the challenge of maintaining a secure environment has become more demanding. This is where DevSecOps steps in, embedding security into every phase of the development lifecycle. By shifting security left and integrating automated checks within the CI/CD pipeline, DevSecOps enables teams to identify vulnerabilities early and respond to risks before they escalate. This continuous integration of security ensures that cloud environments are protected at all times, even as they evolve and scale. DevSecOps is a solution that offers the speed and efficiency needed to secure fast-paced cloud operations without sacrificing security.

AgileBlue takes cloud security a step further by offering AI-powered solutions that seamlessly integrate with DevSecOps workflows. With tools like Cerulean AI and Sapphire AI, AgileBlue provides continuous threat detection, automated responses, and 24/7 monitoring, all designed to protect cloud environments from emerging risks. These AI-driven capabilities adapt to each organization's unique security needs, ensuring that as cloud infrastructures evolve, security stays one step ahead. By partnering with AgileBlue, organizations can confidently secure their cloud infrastructure, enhance their DevSecOps strategy, and mitigate threats before they impact operations.

CERULEAN AI

AI-Powered SecOps Platform

VIDEO PRODUCT TOUR



EVERYTHING YOU NEED: ALL IN ONE INNOVATIVE PLATFORM

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AgileBlue Cerulean AI combines AI-powered cybersecurity with the human touch you trust. Our SecOps platform autonomously detects, investigates, and responds to endpoints, network, and cloud cyber-attacks faster and more accurately than a traditional SOAR.

Our technology is both intelligent and automated, but we take a custom approach for every client we work with, analyzing and detecting exactly what matters most. Our products are entirely cloud-based with advanced machine learning and user behavior analytics, all supported by our U.S.-based team of cyber experts.

For more information, visit our website: AgileBlue.com.

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