Week 4 Report – Buildable Fellowship

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Topic: GitHub Actions and Security Automation

Introduction

In Week 4 of the Buildables Fellowship, my focus was on strengthening automation and security within the **DevOps lifecycle** using **GitHub Actions**. This week revolved around integrating **Static Application Security Testing (SAST)**, **Dynamic Application Security Testing (DAST)**, and **Container Image Scanning** into continuous integration pipelines. I also explored **Configuration & Release Management** and the **Fundamentals of Observability**, which are essential to maintaining secure, reliable, and scalable infrastructure. Learning to combine automation with security gave me a clearer view of how modern organizations adopt **DevSecOps**—embedding security checks directly into the software delivery process, ensuring that vulnerabilities are detected and mitigated early in the development cycle.

Key Learnings

1. GitHub Actions – Automated CI/CD Pipelines

- Designed end-to-end **automated pipelines** in GitHub Actions to streamline code testing, security scanning, and deployment.
- Configured multiple jobs within .github/workflows/ to handle various tasks such as **SAST**, **DAST**, and **container scanning**.
- Practiced uploading scan results and artifacts (e.g., **Bandit** and **ZAP reports**) for centralized review.
- **Real-world application:** This automation approach mirrors how companies like **Netflix** and **Spotify** use GitHub Actions to continuously deliver secure updates without manual intervention, improving both speed and quality assurance.

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2. SAST (Static Application Security Testing)

- Implemented **Bandit**, a Python security linter, to automatically scan source code for common vulnerabilities (e.g., insecure imports, unsafe function calls).
- Configured Bandit with -ll and -ii flags to detect **medium** and **high-severity** issues during pipeline execution.
- Exported results as bandit-report.json and uploaded them as artifacts for easy tracking and integration with issue management tools.

- Used the **PyGoat Actions** repository for hands-on testing—mimicking real-world projects where automated scans are run on every code commit.
- **Industry relevance:** Many fintech and healthcare companies implement SAST early in CI/CD to comply with **OWASP Top 10** and **ISO 27001** security standards.

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3. DAST (Dynamic Application Security Testing)

- Integrated **OWASP ZAP baseline scans** to identify runtime vulnerabilities in a live **PyGoat container** environment.
- Utilized the zaproxy/action-baseline GitHub Action to automate DAST execution after container deployment.
- Generated **zap_report.html** artifacts highlighting vulnerabilities such as **Cross-Site Scripting (XSS)**, **Cross-Site Request Forgery (CSRF)**, and **Open Redirects**.
- **Real-world example:** Enterprises like **Atlassian** and **Red Hat** automate ZAP scans within CI/CD to catch exploitable issues before production releases, reducing security risks significantly.

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4. Image Scanning (Container Security)

- Integrated **Docker Scout** to analyze built Docker images for known **CVEs (Common Vulnerabilities and Exposures)** and misconfigurations.
- Automated the build and scan process in GitHub Actions so that every new image is validated before being pushed to production.
- Reviewed vulnerability reports from pipeline logs and learned how to prioritize patches based on severity.
- **Practical insight:** Image scanning is a common practice in cloud-native environments—platforms like **AWS ECR** and **Google Artifact Registry** provide similar vulnerability scanning features for container images.

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5. Configuration & Release Management

- Studied the importance of **Configuration Management** tools like **Ansible** for automating server provisioning, application setup, and environment consistency.
- Explored **Blue-Green** and **Rolling Deployment** strategies to minimize downtime during releases.
- Simulated small-scale configuration scripts to deploy a test environment automatically.

- **Real-world relevance:** Organizations such as **Airbnb** and **LinkedIn** use Ansible and GitHub Actions together to automate environment provisioning and deploy updates with zero downtime.

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6. Observability Fundamentals

- Gained an understanding of **logs**, **metrics**, and **traces**—the three key pillars of observability that enable teams to monitor system health and performance.
- Explored monitoring tools like **Prometheus** for metrics collection and **Grafana** for visualization dashboards.
- Practiced using curl commands to inspect application metrics endpoints, simulating how engineers observe microservices health in real time.
- **Real-world use case:** In production systems like **Kubernetes clusters**, Prometheus and Grafana are used to alert DevOps teams about anomalies before they impact end-users.

Hands-on Practice

- Built and secured automated **CI/CD pipelines** integrating SAST, DAST, and image scanning workflows.
- Generated and uploaded security artifacts (e.g., bandit-report.json, zap_report.html) for auditing.
- Practiced Ansible for configuration management and release automation.
- Implemented observability techniques using Prometheus and Grafana for real-time monitoring simulation.
- Verified that each automation step improved the overall reliability, traceability, and security of the development process.

Conclusion

Week 4 was a significant step toward understanding how **security, automation, and observability** come together in a real-world DevSecOps environment. By integrating tools like **Bandit**, **ZAP**, **Docker Scout**, and **Ansible** into automated GitHub workflows, I gained valuable experience in building secure and scalable CI/CD pipelines. These practices reflect how modern tech companies deliver software confidently—continuously, securely, and with full visibility across every stage of deployment.

THE END.