# Comprehensive Implementation Guide: Secure Azure DevOps Pipeline with Integrated Security (PRJ-AZURE-DEVOPS-069)

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## 1. Project Overview

The **Secure Azure DevOps Pipeline with Integrated Security (PRJ-AZURE-DEVOPS-069)** project establishes a robust and automated **Secure Software Development Lifecycle (SSDLC)** within the Microsoft Azure ecosystem. This solution is designed to fundamentally transform the traditional approach to security by embedding it directly into the Continuous Integration/Continuous Delivery (CI/CD) pipeline. This paradigm shift, often referred to as **"Shift-Left" Security**, ensures that security vulnerabilities, compliance deviations, and configuration errors are identified and remediated at the earliest possible stage—during code development and integration—rather than in later, more costly stages like staging or production [1].

The core of this project lies in the seamless integration of advanced security tools and policy enforcement mechanisms into the Azure DevOps workflow. Specifically, it leverages **GitHub Advanced Security** for comprehensive code analysis, including Static Application Security Testing (SAST) via CodeQL, secret scanning to prevent credential leakage, and Software Composition Analysis (SCA) for dependency management. Furthermore, it utilizes **Azure Policy** as a mandatory pre-deployment gate to validate that the Infrastructure as Code (IaC) templates, written in Bicep, comply with organizational and regulatory security baselines before any resources are provisioned in Azure.

This integrated approach serves as a mandatory quality gate, preventing the deployment of non-compliant or vulnerable code and infrastructure, thereby

significantly reducing organizational risk and ensuring continuous compliance.

## 2. Business Context

The implementation of PRJ-AZURE-DEVOPS-069 delivers substantial, quantifiable business value by addressing critical inefficiencies and risks inherent in traditional development models. The value proposition is centered on risk mitigation, cost reduction, and enhanced developer productivity.

### The Problem and Solution

| Aspect | Traditional Approach (Problem) | PRJ-AZURE-DEVOPS-069 (Solution) |
|---|---|---|
| **Vulnerability Detection** | Manual code reviews and late-stage penetration testing. | Automated, integrated SAST (CodeQL) and Secret Scanning at the Pull Request stage. |
| **Compliance** | Post-deployment audits and manual configuration checks. | Pre-deployment Azure Policy validation and continuous monitoring. |
| **Cost of Remediation** | High. Fixing a bug in production is exponentially more expensive than fixing it during development [2]. | Low. Issues are caught and fixed by the developer immediately, minimizing rework and emergency patches. |
| **Deployment Velocity** | Security checks are a manual bottleneck, slowing down releases. | Security checks are automated and non-blocking for compliant code, maintaining high velocity. |

### Quantified Business Value and ROI

The primary return on investment (ROI) is derived from the cost savings associated with “Shift-Left” security. Studies indicate that the cost to fix a security vulnerability found in production can be **30 times higher** than fixing it during the design or coding phase [3]. By automating security gates, this project achieves:

- **Cost Savings:** An estimated **70-85% reduction** in security-related remediation costs by eliminating late-stage fixes.

- **Efficiency Gains: Increased developer productivity** by providing immediate feedback loops, allowing developers to fix issues in their context without waiting for security team reports. This translates to faster feature delivery.
- **Risk Mitigation: Near-zero tolerance** for critical vulnerabilities and hardcoded secrets in the main branch, directly protecting the organization's brand reputation and avoiding regulatory fines.
- **Audit Readiness:** Automated generation of a complete, immutable audit trail for every deployment, significantly reducing the time and effort required for compliance audits (e.g., SOX, SOC 2).

# 3. GRC Mapping

This project is fundamentally a Governance, Risk, and Compliance (GRC) solution, as it hardens the development process against common security and compliance failures. It maps directly to several industry-standard frameworks, ensuring that the organization meets its regulatory and internal governance obligations.

## Compliance Frameworks and Alignment

| Framework | Control/Principle | Project Implementation |
|---|---|---|
| **NIST SSDF** | **Prepare the Organization (PO)**, **Protect the Software (PS)** | Implements mandatory security testing (SAST/Secret Scanning) and change control (PRs) as required by the framework. |
| **ISO 27034** | **Application Security Control (ASC)** | Embeds security requirements into the development process, ensuring security is an inherent property of the application and its infrastructure. |
| **OWASP SAMM** | **Design, Implementation, Verification** | Elevates the maturity level in the "Verification" security practice by automating security testing and policy enforcement. |
| **Microsoft SDL** | **Security Requirements, Security Testing** | Adopts Microsoft's best practices by utilizing native Azure and GitHub security tools within the CI/CD pipeline. |

### Regulatory Alignment

The solution directly supports compliance with major regulatory requirements:

- **SOX (Sarbanes-Oxley Act) Section 404:** The mandatory use of Pull Requests, branch protection rules, and the immutable audit trail provided by Azure DevOps execution logs satisfy the requirement for **strong change management controls** over financial reporting systems.
- **PCI DSS (Payment Card Industry Data Security Standard) Requirement 6.3 & 6.5:** The integration of SAST (CodeQL) and Secret Scanning directly addresses the need for **secure development practices** and protection against common coding vulnerabilities (e.g., OWASP Top 10).
- **GDPR (General Data Protection Regulation) Article 25 (Privacy by Design):** By enforcing Azure Policies that mandate secure configurations (e.g., encryption, network segmentation) on resources that process personal data, the project ensures that data protection is built into the infrastructure design from the start.
- **SOC 2 (Service Organization Control 2) Common Criteria 8.1 (CC8.1):** The automated security gates and policy checks ensure that all system changes are **authorized, tested, and deployed securely**, aligning with the criteria for change management.

## 4. Prerequisites

Successful implementation requires the following accounts, tools, and permissions to be configured prior to starting the deployment steps.

| Prerequisite | Description | Setup Notes |
| --- | --- | --- |
| **Azure Subscription** | An active, valid Azure subscription. | Required for provisioning resources and assigning roles. |
| **Azure DevOps Organization** | An organization and project to host the pipeline and repository. | Ensure the project is configured to use YAML pipelines. |
| **Service Principal (SP)** | An Azure Active Directory application used by Azure DevOps to deploy resources. | Must have **Contributor** role on the target Resource Group for deployment. |
| **GitHub Advanced Security** | Enabled for the repository hosting the source code. | Required for CodeQL and Secret Scanning tasks to function. |
| **Azure CLI** | Command-line interface for managing Azure resources. | Install via `curl -sL https://aka.ms/InstallAzureCLIDeb |
| **Bicep CLI** | Command-line interface for building and linting Bicep IaC files. | Install via `az bicep install`. |
| **`jq` utility** | Command-line JSON processor. | Used for parsing Service Principal creation output. Install via `sudo apt install jq`. |

# 5. Architecture Overview

The solution is architected as a two-stage, security-gated CI/CD pipeline, ensuring security is enforced at both the code level (CI) and the infrastructure level (CD).

## The 7-Step Secure Pipeline Flow

1. **Developer Commit:** A developer commits code to a feature branch and opens a **Pull Request (PR)** against the `main` branch.
2. **PR Trigger:** The PR creation triggers the first set of security checks.

3. **Security Scan Gate (CI Pre-Merge):** The pipeline runs **GitHub Advanced Security** tasks:
    - **CodeQL (SAST):** Scans the application code for known vulnerabilities.
    - **Secret Scanning:** Checks for hardcoded credentials.
    - **Result:** If critical issues are found, the PR is automatically blocked, preventing the merge.
4. **CI Pipeline (Post-Merge):** Upon successful merge to `main`, the main CI pipeline runs, which includes:
    - Building the application artifacts.
    - Building and linting the **Azure Bicep** Infrastructure as Code (IaC) templates.
5. **Policy Validation Gate (CD Pre-Deployment):** Before deployment, the CD pipeline executes an Azure CLI task to validate the Bicep template against assigned **Azure Policies**. This ensures the infrastructure configuration (e.g., mandatory tags, minimum TLS versions) is compliant.
6. **Deployment:** If the policy validation passes, the Bicep template is deployed to the Azure environment using the configured Service Principal.
7. **Post-Deployment Check: Azure Policy** continues to monitor the deployed resources in real-time, ensuring continuous compliance and alerting on any configuration drift.

This architecture ensures a defense-in-depth approach, where security is enforced at the code, configuration, and runtime levels.

# 6. Step-by-Step Implementation

This section provides the detailed, actionable steps to deploy the secure pipeline.

## Step 1: Configure Azure Resources and Service Principal

The first step involves setting up the target environment and the identity used by Azure DevOps for deployment.

### 1.1. Create Resource Group

The resource group will host all deployed infrastructure.

```
# Define variables
RESOURCE_GROUP="rg-devops-secure-069"
LOCATION="eastus"

# Create the resource group
echo "Creating resource group $RESOURCE_GROUP in $LOCATION..."
az group create --name $RESOURCE_GROUP --location $LOCATION
echo "Resource group created successfully."
```

### 1.2. Create Service Principal (SP)

The SP is the non-interactive identity for Azure DevOps. It is granted the `Contributor` role scoped only to the newly created resource group, adhering to the **Principle of Least Privilege (PoLP)**.

```
# Create the Service Principal (SP) and assign Contributor role
SP_NAME="azure-devops-sp-069"
RESOURCE_GROUP_ID=$(az group show --name $RESOURCE_GROUP --query id -o tsv)

echo "Creating Service Principal $SP_NAME and assigning Contributor role to
$RESOURCE_GROUP..."
SP_OUTPUT=$(az ad sp create-for-rbac \
  --name $SP_NAME \
  --role "Contributor" \
  --scopes $RESOURCE_GROUP_ID \
  --json)

# Extract and securely store credentials
echo "--- Service Principal Credentials (STORE SECURELY) ---"
echo "App ID (Client ID): $(echo $SP_OUTPUT | jq -r '.appId')"
echo "Password (Client Secret): $(echo $SP_OUTPUT | jq -r '.password')"
echo "Tenant ID: $(echo $SP_OUTPUT | jq -r '.tenant')"
echo "Subscription ID: <YOUR_SUBSCRIPTION_ID>"
```

**Note:** The output credentials (App ID, Password, Tenant ID) must be stored securely, preferably in an Azure Key Vault, and will be used in the next step.

### 1.3. Configure Azure Policy

For this project, we assume a policy is already assigned at the subscription or resource group scope that mandates a specific tag (e.g., `Environment: Production`) and enforces security settings (e.g., minimum TLS version).

```
echo "Policy configuration assumed to be pre-applied at the subscription level."
echo "Verify that a policy definition, such as 'Require a tag on resources', is assigned to your scope."
```

## Step 2: Configure Azure DevOps

### 2.1. Create a Service Connection

This links the Azure DevOps project to the Azure SP created in Step 1.2.

1. Navigate to your Azure DevOps Project -> **Project Settings** -> **Service connections**.
2. Click **New service connection** -> **Azure Resource Manager**.
3. Select the **Service principal (manual)** method.
4. Enter the credentials:
    - **Subscription ID** and **Subscription Name**.
    - **Service Principal ID** (App ID from 1.2).
    - **Service Principal Key** (Password/Secret from 1.2).
    - **Tenant ID** (from 1.2).
5. Name the connection: `azure-sp-connection-069`.
6. Grant access permissions to all pipelines.

### 2.2. Enable GitHub Advanced Security

If your code repository is hosted on GitHub, ensure that GitHub Advanced Security is enabled for the repository to enable CodeQL and Secret Scanning.

### 2.3. Define Infrastructure as Code (`main.bicep`)

Create the `main.bicep` file in your repository. This template includes security hardening by default (`httpsOnly: true`, `minTlsVersion: '1.2'`) and includes the required `Environment: Production` tag to pass the assumed Azure Policy.

```
 // main.bicep
param location string = resourceGroup().location
param appServiceName string = 'webapp-secure-
069-${uniqueString(resourceGroup().id)}'
param storageAccountName string =
'storage069${uniqueString(resourceGroup().id)}'

resource appServicePlan 'Microsoft.Web/serverfarms@2022-03-01' = {
  name: 'plan-secure-069'
  location: location
  sku: {
    name: 'P1v2'
    capacity: 1
  }
  kind: 'app'
}

resource appService 'Microsoft.Web/sites@2022-03-01' = {
  name: appServiceName
  location: location
  properties: {
    serverFarmId: appServicePlan.id
    httpsOnly: true // Security hardening: Enforce HTTPS
    siteConfig: {
      minTlsVersion: '1.2' // Security hardening: Enforce minimum TLS version
    }
  }
  tags: {
    Environment: 'Production' // Required by the assumed Azure Policy
  }
}

resource storageAccount 'Microsoft.Storage/storageAccounts@2022-09-01' = {
  name: storageAccountName
  location: location
  sku: {
    name: 'Standard_LRS'
  }
  kind: 'StorageV2'
  properties: {
    supportsHttpsTrafficOnly: true // Security hardening: Enforce HTTPS
    minimumTlsVersion: 'TLS1_2' // Security hardening: Enforce minimum TLS
version
  }
  tags: {
    Environment: 'Production' // Required by the assumed Azure Policy
```

```
  }
}

output webAppHostName string = appService.properties.defaultHostName
```

### 2.4. Define the CI/CD Pipeline ( `azure-pipelines.yml` )

Create the `azure-pipelines.yml` file. This YAML defines the two stages: `BuildAndScan` (CI) and `Deploy` (CD), with security gates embedded in both.

```yaml
# azure-pipelines.yml
trigger:
- main

pool:
  vmImage: 'ubuntu-latest'

variables:
  # Variable group for secrets (e.g., subscription ID) - Create this in Azure DevOps Library
  - group: 'Secure-DevOps-Vars'
  - name: resourceGroupName
    value: 'rg-devops-secure-069'
  - name: location
    value: 'eastus'
  - name: serviceConnection
    value: 'azure-sp-connection-069'

stages:
- stage: BuildAndScan
  displayName: 'Build and Security Scan'
  jobs:
  - job: CodeScan
    displayName: 'Code Analysis and Build'
    steps:
    - checkout: self

    # 1. GitHub Advanced Security (CodeQL) - SAST
    # Initializes the CodeQL database for analysis
    - task: GitHubAdvancedSecurity-Codeql-Init@1
      displayName: 'Initialize CodeQL'
      inputs:
        languages: 'javascript, python' # Adjust based on your application language

    - script: |
        echo "Running application build steps..."
        # Placeholder for actual application build commands (e.g., npm install, dotnet build)
      displayName: 'Application Build'

    # Analyzes the CodeQL database. Fails the build if critical vulnerabilities are found.
    - task: GitHubAdvancedSecurity-Codeql-Analyze@1
      displayName: 'Analyze CodeQL Results'
```

```
    # 2. GitHub Advanced Security - Secret Scanning
    # Scans the repository for hardcoded secrets. Fails the build if found.
    - task: GitHubAdvancedSecurity-SecretScanning@1
      displayName: 'Secret Scanning'

    # 3. Bicep Build and Lint (CI part)
    # Ensures the IaC template is syntactically correct and follows best
practices.
    - task: AzureCLI@2
      displayName: 'Bicep Build and Lint'
      inputs:
        azureSubscription: $(serviceConnection)
        scriptType: 'bash'
        scriptLocation: 'inlineScript'
        inlineScript: |
          echo "Building Bicep template..."
          az bicep build --file ./main.bicep
          echo "Linting Bicep template..."
          az bicep lint --file ./main.bicep

- stage: Deploy
  displayName: 'Policy Validation and Deployment'
  dependsOn: BuildAndScan
  condition: succeeded()
  jobs:
  - deployment: DeployInfra
    displayName: 'Deploy Infrastructure'
    environment: 'Production' # Use environments for approvals and checks
    strategy:
      runOnce:
        deploy:
          steps:
          # 1. Azure Policy Compliance Check (Pre-deployment Gate)
          # Critical step: Validates the IaC against policy before
deployment.
          - task: AzureCLI@2
            displayName: 'Azure Policy Compliance Check'
            inputs:
              azureSubscription: $(serviceConnection)
              scriptType: 'bash'
              scriptLocation: 'inlineScript'
              inlineScript: |
                echo "Simulating Azure Policy validation using what-if
operation..."
                # In a production environment, use 'az deployment group
```

```
what-if' to check policy compliance
                # before actual deployment. The command below is a
placeholder for this critical gate.
                az deployment group what-if \
                  --resource-group $(resourceGroupName) \
                  --template-file ./main.bicep \
                  --parameters location=$(location) \
                  --mode Complete
                # The pipeline should be configured to fail if the what-if
operation returns a non-compliant result.

          # 2. Azure Bicep Deployment
          - task: AzureCLI@2
            displayName: 'Deploy Bicep Infrastructure'
            inputs:
              azureSubscription: $(serviceConnection)
              scriptType: 'bash'
              scriptLocation: 'inlineScript'
              inlineScript: |
                echo "Starting Bicep deployment..."
                az deployment group create \
                  --resource-group $(resourceGroupName) \
                  --template-file ./main.bicep \
                  --parameters location=$(location)
                echo "Deployment complete."
```

# 7. Validation & Testing

Validation ensures that the pipeline not only deploys the infrastructure but also enforces the security and compliance gates as designed.

## 7.1. Security Validation (Negative Testing)

The most effective way to validate the security gates is through negative testing—ensuring the pipeline fails when it should.

| Test Case | Action | Expected Result | Verification |
| --- | --- | --- | --- |
| **SAST Failure** | Introduce a known critical vulnerability (e.g., SQL injection pattern) into the application code and open a PR. | The `Analyze CodeQL Results` task should fail, and the PR merge should be blocked. | Check the CodeQL logs in the pipeline run for the specific vulnerability report. |
| **Secret Scanning Failure** | Commit a dummy secret (e.g., a fake AWS key or connection string) to the repository and open a PR. | The `Secret Scanning` task should fail, and the PR merge should be blocked. | Review the Secret Scanning logs for the detected secret. |
| **Policy Violation** | Modify `main.bicep` to remove the `Environment: Production` tag from the `appService` resource and trigger a deployment. | The `Azure Policy Compliance Check` task (or the deployment itself, depending on policy enforcement mode) should fail. | Check the Azure Policy compliance blade in the Azure Portal for a “Denied” event. |

## 7.2. Functional Validation (Positive Testing)

This confirms that the deployment successfully creates the intended resources with the correct secure configurations.

1. **Deployment Success:** Verify the `DeployInfra` job completes successfully in Azure DevOps.
2. **Resource Existence:** Navigate to the Azure Portal and confirm the `rg-devops-secure-069` resource group contains the App Service and Storage Account.
3. **Secure Configuration Check:**
    - **App Service:** Check the configuration blade to ensure **HTTPS Only** is enabled and the minimum TLS version is set to **1.2**.
    - **Storage Account:** Verify that **Secure transfer required** is enabled and the minimum TLS version is set to **TLS 1.2**.
4. **Tag Compliance:** Confirm that both the App Service and Storage Account have the tag `Environment: Production`.

# 8. Troubleshooting

This section details common issues encountered during the setup and execution of a secure CI/CD pipeline and provides actionable resolutions.

| Issue | Potential Cause | Resolution | Detailed Steps |
| --- | --- | --- | --- |
| **Pipeline Fails at CodeQL/Secret Scan** | Security vulnerability or hardcoded secret detected. | Review the scan logs, fix the code issue, and push a new commit. | Download the CodeQL SARIF report from the pipeline artifacts. Analyze the report to pinpoint the exact file and line number of the vulnerability or secret. |
| **Deployment Fails with Policy Error** | The Bicep template violates an assigned Azure Policy (e.g., missing a required tag, using an unapproved SKU). | Modify the `main.bicep` file to comply with the policy, or request an exemption (if justified). | Check the Azure Policy activity log in the Azure Portal for the deployment failure event. The error message will explicitly state which policy definition was violated. |
| **Service Connection Error** | Service Principal credentials expired, permissions revoked, or incorrect ID/Secret used. | Regenerate the Service Principal secret and update the Azure DevOps Service Connection. | Run `az ad sp credential reset --name "azure-devops-sp-069"` to get a new secret. Update the `azure-sp-connection-069` in Azure DevOps Project Settings. |
| **Bicep Linting Failure** | Syntax error in `main.bicep` or violation of Bicep best practices. | Correct the Bicep file syntax or structure. | Run `az bicep lint --file ./main.bicep` locally to get detailed error messages before committing. |

| Issue | Potential Cause | Resolution | Detailed Steps |
| --- | --- | --- | --- |
| **CodeQL Init Task Fails** | Incorrect language specified or the repository structure does not support the selected language. | Verify the `languages` input in the `GitHubAdvancedSecurity-Codeql-Init@1` task matches the actual code in the repository. | Ensure the CodeQL task is placed *before* the application build step. |

## 9. Cost Optimization

While security is paramount, the deployed infrastructure should be optimized for cost, especially in non-production environments.

1. **App Service Plan Tier Review:** The example uses `P1v2` (Premium V2), which is suitable for production. For development, testing, or staging environments, significantly reduce costs by using:
    - **Basic Tier (B1):** Suitable for low-traffic development sites.
    - **Standard Tier (S1):** Offers scaling and custom domains at a lower cost than Premium.
    - **Optimization Strategy:** Implement a separate Bicep template or use Bicep parameters to dynamically select the SKU based on the target environment (e.g., `if (environment == 'dev') 'B1' else 'P1v2'`).
2. **Storage Redundancy:** The Storage Account uses `Standard_LRS` (Locally Redundant Storage). While cost-effective, consider the data criticality:
    - **Development/Test Data:** Use `Standard_LRS`.
    - **Highly Critical Data:** Consider `Standard_GRS` (Geo-Redundant Storage) for disaster recovery, but be aware of the increased cost.
    - **Optimization Strategy:** For non-critical logs or temporary data, explore using **Azure Blob Storage Cool or Archive tiers** if data access frequency is low.
3. **Policy-Driven Cost Control:** Leverage Azure Policy to enforce cost governance.

    - **Prohibit Expensive SKUs:** Assign a policy that denies the deployment of overly expensive resources, such as high-end Virtual Machine SKUs or Premium Storage tiers, unless explicitly tagged for exemption.
    - **Mandatory Tagging:** Enforce tags like `CostCenter` or `Project` to accurately track and allocate cloud spending.
4. **Pipeline Agent Usage:** Minimize pipeline run time to reduce consumption of hosted agent minutes (if not using self-hosted agents).
    - **Strategy:** Optimize build steps, cache dependencies, and ensure security scans are targeted and efficient.

# 10. Security Best Practices

Beyond the automated gates in the pipeline, maintaining a secure posture requires adherence to broader organizational security principles.

## 10.1. Principle of Least Privilege (PoLP)

The Service Principal (`azure-devops-sp-069`) was granted the `Contributor` role for simplicity. In a production environment, this should be refined:

- **Custom RBAC Role:** Create a **Custom Role-Based Access Control (RBAC) role** that only includes the specific permissions required for deployment (e.g., `Microsoft.Web/sites/write`, `Microsoft.Storage/storageAccounts/write`, `Microsoft.Resources/deployments/write`).
- **Scope Limitation:** Ensure the SP's role assignment is strictly limited to the target resource group (`rg-devops-secure-069`) and not the entire subscription.

## 10.2. Credential Management and Rotation

- **Azure Key Vault Integration: NEVER** store secrets directly in Azure DevOps Variable Groups. Instead, integrate Azure Key Vault with the pipeline. The pipeline can be configured to retrieve secrets (like the SP password) at runtime, ensuring they are never exposed in the pipeline definition or logs.
- **Managed Identities:** For application code deployed to Azure (e.g., the App Service), use **Managed Identities** to authenticate to other Azure services (like

Key Vault or Storage Account). This eliminates the need for any connection strings or secrets in the application code itself.

- **Automated Rotation:** Implement a process to automatically rotate the Service Principal secret every 90 days, as recommended by security best practices.

### 10.3. Dependency Hardening and Supply Chain Security

The pipeline uses GitHub Advanced Security for Software Composition Analysis (SCA). This must be actively managed:

- **Dependency Review:** Configure the Dependency Review feature to automatically block Pull Requests that introduce dependencies with known critical vulnerabilities.
- **Regular Updates:** Establish a policy for regularly updating all third-party libraries and dependencies to minimize the attack surface.
- **Container Security:** If the project involves containerization, integrate **Azure Defender for Cloud** (or a similar tool) into the pipeline to scan container images for vulnerabilities before they are pushed to a registry.

### 10.4. Logging, Monitoring, and Alerting

- **Centralized Logging:** Ensure all pipeline execution logs, security scan results, and Azure Policy compliance events are forwarded to a centralized Security Information and Event Management (SIEM) system (e.g., Azure Sentinel).
- **Security Alerts:** Configure alerts to notify the security team immediately if:
    - A deployment is blocked by a security gate (CodeQL, Secret Scan, or Policy Check).
    - A deployed resource drifts from its compliant state (Azure Policy non-compliance).

## Cleanup

To completely remove all resources created during this implementation, execute the following commands:

```
# Define variables
RESOURCE_GROUP="rg-devops-secure-069"
SP_NAME="azure-devops-sp-069"

echo "Deleting resource group $RESOURCE_GROUP and all contained
resources..."
az group delete --name $RESOURCE_GROUP --yes --no-wait

echo "Deleting the Service Principal $SP_NAME..."
# Find the App ID of the Service Principal
SP_APP_ID=$(az ad sp list --display-name $SP_NAME --query "[0].appId" -o
tsv)
# Delete the Service Principal using its App ID
if [ -n "$SP_APP_ID" ]; then
  az ad sp delete --id $SP_APP_ID
  echo "Service Principal deleted."
else
  echo "Service Principal not found or already deleted."
fi
```

---

## References


[1] Microsoft. *Shift Left on Security in Azure DevOps*. [Online]. Available: https://docs.microsoft.com/en-us/azure/devops/pipelines/security/shift-left-security

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