Controlling Deployments using Classic Release Gates

Lab requirements

- Identify an existing Azure subscription or create a new one.
- Verify that you have a Microsoft account or an Azure AD account with the Owner role in the Azure subscription and the Global Administrator role in the Azure AD tenant associated with the Azure subscription.

Lab overview

This lab covers the configuration of the deployment gates and details how to use them to control the execution of Azure Pipelines. To illustrate their implementation, you'll configure a release definition with two environments for an Azure Web App. You'll deploy to the Canary environment only when there are no blocking bugs for the app and mark the Canary environment complete only when there are no active alerts in Application Insights of Azure Monitor.

A release pipeline specifies the end-to-end release process for an application to be deployed across various environments. Deployments to each environment are fully automated by using jobs and tasks. Ideally, you don't want new updates to the applications to be simultaneously exposed to all the users. It's a best practice to expose updates in a phased manner, that is, expose them to a subset of users, monitor their usage, and expose them to other users based on the experience of the initial set of users.

Approvals and gates enable you to take control over the start and completion of the deployments in a release. You can wait for users to approve or reject deployments with approvals manually. Using release gates, you can specify application health criteria to be met before the release is promoted to the following environment. Before or after any environment deployment, all the specified gates are automatically evaluated until they pass or reach your defined timeout period and fail.

Gates can be added to an environment in the release definition from the pre-deployment conditions or the post-deployment conditions panel. Multiple gates can be added to the environment conditions to ensure all the inputs are successful for the release.

As an example:

- Pre-deployment gates ensure no active issues in the work item or problem management system before deploying a build to an environment.
- Post-deployment gates ensure no incidents from the app's monitoring or incident management system after being deployed before promoting the release to the following environment.

There are 4 types of gates included by default in every account.

- Invoke Azure Function: Trigger the execution of an Azure Function and ensures a successful completion.
- Query Azure Monitor alerts: Observe the configured Azure Monitor alert rules for active alerts.
- Invoke REST API: Make a call to a REST API and continues if it returns a successful response.
- Query work items: Ensure the number of matching work items returned from a query is within a threshold.

Instructions

Exercise 0: Configure the lab prerequisites

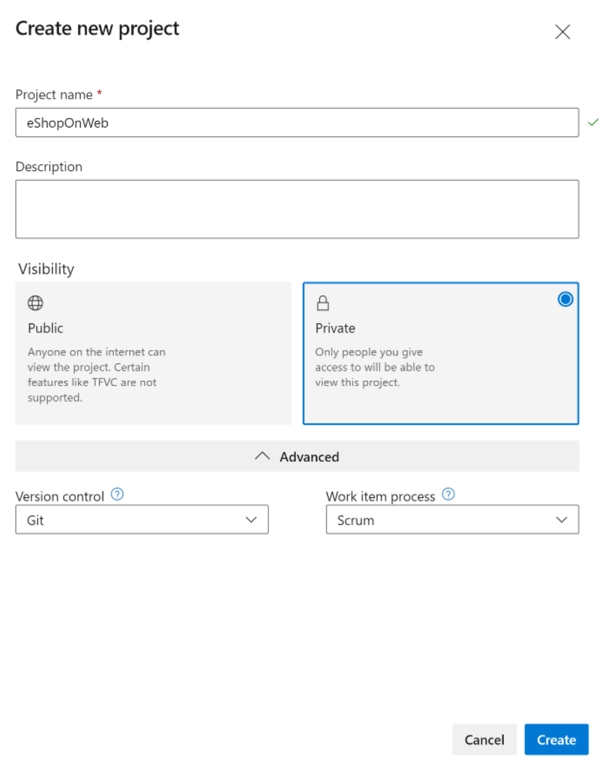
Note: If you already created this project during previous labs, this exercise can be skipped.

In this exercise, you will set up the prerequisites for the lab, which consist of a new Azure DevOps project with a repository based on the eShopOnWeb.

Task 1: (skip if already done) Create and configure the team project

In this task, you will create an **eShopOnWeb** Azure DevOps project to be used by several labs.

1. On your lab computer, in a browser window open your Azure DevOps organization. Click on **New Project**. Give your project the name **eShopOnWeb** and leave the other fields with defaults. Click on **Create**.



Create new project

Project name *
eShopOnWeb

Description

Visibility

Public
Anyone on the internet can view the project. Certain features like TFVC are not supported.

Private
Only people you give access to will be able to view this project.

Advanced

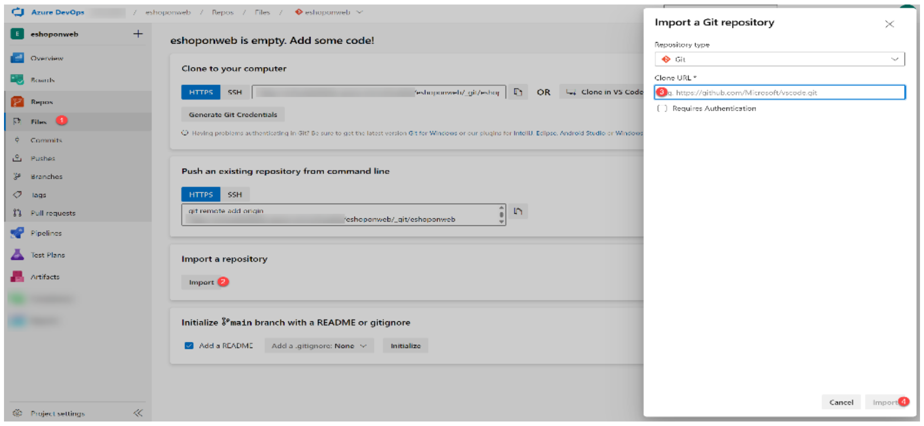
Version control: Git

Work item process: Scrum

Task 2: (skip if already done) Import eShopOnWeb Git Repository

In this task you will import the eShopOnWeb Git repository that will be used by several labs.

1. On your lab computer, in a browser window open your Azure DevOps organization and the previously created **eShopOnWeb** project. Click on **Repos>Files** , **Import a Repository**. Select **Import**. On the **Import a Git Repository** window, paste the following URL https://github.com/MicrosoftLearning/eShopOnWeb.git and click **Import**:



eshoponweb is empty. Add some code!

Clone to your computer

HTTPS SSH …eshoponweb/_git/eshop… OR Clone in VS Code

Generate Git Credentials

Having problems authenticating in Git? Be sure to get the latest version Git for Windows or our plugins for IntelliJ, Eclipse, Android Studio or Windows…

Push an existing repository from command line

HTTPS SSH

```
git remote add origin
…eshoponweb/_git/eshoponweb
```

Import a repository

Initialize main branch with a README or gitignore

Import a Git repository

Repository type: Git

Clone URL *
3 e.g. https://github.com/Microsoft/vscode.git

Requires Authentication

2. The repository is organized the following way:
    - **.ado** folder contains Azure DevOps YAML pipelines
    - **.devcontainer** folder container setup to develop using containers (either locally in VS Code or GitHub Codespaces)
    - **.azure** folder contains Bicep&ARM infrastructure as code templates used in some lab scenarios.
    - **.github** folder container YAML GitHub workflow definitions.
    - **src** folder contains the .NET 6 website used on the lab scenarios.

Task 3: (skip if already done) Configure CI Pipeline as Code with YAML in Azure DevOps

In this task, you will add a YAML build definition to the existing project.

1. Navigate back to the **Pipelines** pane in of the **Pipelines** hub.
2. In the **Create your first Pipeline** window, click **Create pipeline**.
3. On the **Where is your code?** pane, click **Azure Repos Git (YAML)** option.
4. On the **Select a repository** pane, click **eShopOnWeb**.
5. On the **Configure your pipeline** pane, scroll down and select **Existing Azure Pipelines YAML File**.
6. In the **Selecting an existing YAML File** blade, specify the following parameters:
    - Branch: **main**
    - Path: **.ado/eshoponweb-ci.yml**
7. Click **Continue** to save these settings.
8. From the **Review your Pipeline YAML** screen, click **Run** to start the Build Pipeline process.
9. Wait for the Build Pipeline to complete successfully. Ignore any warnings regarding the source code itself, as they are not relevant for this lab exercise.

Exercise 2: Creating the necessary Azure Resources for the Release Pipeline

Task 1: Create two Azure web apps

In this task, you will create two Azure web apps representing the **Canary** and **Production** environments, into which you'll deploy the application via Azure Pipelines.

1. From the lab computer, start a web browser, navigate to the **Azure Portal**, and sign in with the user account that has the Owner role in the Azure subscription

you will be using in this lab and has the role of the Global Administrator in the Azure AD tenant associated with this subscription.

2. In the Azure portal, click the **Cloud Shell** icon, located directly to the right of the search textbox at the top of the page.
3. If prompted to select either **Bash** or **PowerShell**, select **Bash**.

   Note: If this is the first time you are starting **Cloud Shell** and you are presented with the **You have no storage mounted** message, select the subscription you are using in this lab, and select **Create storage**.

4. From the **Bash** prompt, in the **Cloud Shell** pane, run the following command to create a resource group (replace the `<region>` variable placeholder with the name of the Azure region that will host the two Azure web apps, for example 'westeurope' or 'centralus' or any other available region of your choice):

   Note: possible locations can be found by running the following command, use the **Name** on `<region>` : `az account list-locations -o table`

```
REGION='centralus'
RESOURCEGROUPNAME='DevOpsl08-RG'
az group create -n $RESOURCEGROUPNAME -l $REGION
```

5. To create an App service plan

```
SERVICEPLANNAME='DevOpsl08-sp1'
az appservice plan create -g $RESOURCEGROUPNAME -n $SERVICEPLANNAME --sku S1
```

6. Create two web apps with unique app names.

```
SUFFIX=$RANDOM$RANDOM
az webapp create -g $RESOURCEGROUPNAME -p $SERVICEPLANNAME -n RGATES$SUFFIX-
Canary
az webapp create -g $RESOURCEGROUPNAME -p $SERVICEPLANNAME -n RGATES$SUFFIX-
Prod
```

   Note: Record the name of the Canary web app. You will need it later in this lab.

7. Wait for the Web App Services Resources provisioning process to complete and close the **Cloud Shell** pane.

Task 2: Configure an Application Insights resource

1. In the Azure portal, use the **Search resources, services, and docs** text box at the top of the page to search for **Application Insights** and, in the list of results, select **Application Insights**.

2. On the **Application Insights** blade, select **+ Create**.
3. On the **Application Insights** blade, on the **Basics** tab, specify the following settings (leave others with their default values):

Setting	Value
Resource group	**DevOpsl08-RG**
Name	the name of the Canary web app you recorded in the previous task
Region	the same Azure region to which you deployed the web apps earlier in the pre
Resource Mode	**Classic**

4. **Note**: Disregard the deprecation message. This is required in order to prevent failures of the Enable Continuous Integration DevOps task you will be using later in this lab.

5. Click **Review + create** and then click **Create**.
6. Wait for the provisioning process to complete.
7. In the Azure portal, navigate to the resource group **DevOpsl08-RG** you created in the previous task.
8. In the list of resources, click the **Canary** web app.
9. On the **Canary** web app page, in the vertical menu on the left, in the **Settings** section, click **Application Insights**.
10. On the **Application Insights** blade, click **Turn on Application Insights**.
11. In the **Change your resource** section, click the **Select existing resource** option, in the list of existing resources, select the newly created Application Insight resource, click **Apply** and, when prompted for confirmation, click **Yes**.
12. Wait until the change takes effect.

Note: You will create monitor alerts here, which you will use in later part of this lab.

13. From the same **Settings** / **Application Insights** menu option within the Web App, select **View Application Insights Data**. This redirects you to the Application Insights blade in the Azure Portal.
14. On the Application Insights resource blade, in the **Monitoring** section, click **Alerts** and then click **Create > Alert rule**.
15. On the **Select a signal** blade, in the **Search by signal name** textbox, type **Requests**. From the list of results, select **Failed Requests**.
16. On the **Create an Alert Rule** blade, in the **Condition** section, leave the **Threshold** set to **Static**, validate the other default settings as follows:
    - Aggregation Type: Count
    - Operator: Greater Than

- Unit: Count

17. In the **Threshold value** textbox, type **0**, and click on **Next:Actions**. Don't make any changes in the **Actions** settings blade, and define the following parameters under the **Details** section:

Setting	Value
Severity	**2- Warning**
Alert rule name	**RGATESCanary_Faile**
Advanced Options: Automatically resolve alerts	**cleared**

18. **Note**: Metric alert rules might take up to 10 minutes to activate.
19. **Note**: You can create multiple alert rules on different metrics such as availability < 99 percent, server response time > 5 Seconds, or server exceptions > 0
20. Confirm the creation of the Alert rule by clicking **Review+Create**, and confirm once more by clicking **Create**. Wait for the alert rule to get created successfully.

Exercise 3: Configure the release pipeline

In this exercise, you will configure a release pipeline.

Task 1: Set Up Release Tasks

In this task, you will set up the release tasks as part of the Release Pipeline.

1. From the **eShopOnWeb** project in the Azure DevOps portal, in the vertical navigational pane, select **Pipelines** and then, within the **Pipelines** section, click **Releases**.
2. Click **New Pipeline**.
3. From the **Select a template** window, **choose Azure App Service Deployment** (Deploy your application to Azure App Service. Choose from Web App on Windows, Linux, containers, Function Apps, or WebJobs) under the **Featured** list of templates.
4. Click **Apply**.
5. From the **Stage** window appearing, update the default "Stage 1" Stage Name to **Canary**. Close the popup window by using the **X** button. You are now in the graphical editor of the Release Pipeline, showing the Canary Stage.

6. Hover the mouse over the Canary Stage, and click the **Clone** button, to copy the Canary Stage to an additional Stage. Name this Stage **Production**.
7. On the **Pipeline** tab, select the **Add an Artifact** rectangle, and select the **eShopOnWeb** in the **Source (build pipeline)** field. Click **Add** to confirm the selection of the artifact.
8. From the **Artifact** rectangle, notice the **Continuous Integration Trigger** (lightning bolt) appearing. Click it to open the **Continuous deployment trigger** settings. Click the continuous deployment trigger to toggle the switch to enable it. Leave all other settings at default and close the **Continuous deployment trigger** pane, by clicking the **x** mark in its upper right corner.
9. Within the **Canary Environments** stage, click the **1 job, 2 tasks** label and review the tasks within this stage.
10. On the **All pipelines > New Release Pipeline** pane, ensure that the **Canary** stage is selected. In the **Azure subscription** dropdown list, select your Azure subscription and click **Authorize**. If prompted, authenticate by using the user account with the Owner role in the Azure subscription.
11. Confirm the App Type is set to "Web App on Windows". Next, in the **App Service name** dropdown list, select the name of the **Canary** web app.
12. Select the Task **Deploy Azure App Service**. In the **Package or Folder** field, update the default value of "$(System.DefaultWorkingDirectory)/**/*.zip" to "$(System.DefaultWorkingDirectory)/**/Web.zip"
13. On the **All pipelines > New Release Pipeline** pane, navigate to the **Pipeline** tab, and this time, within the **Production** Stage, click the **1 job, 2 tasks** label. Similar to the Canary stage earlier, complete the pipeline settings. Under the Tasks tab / Production Deployment process, in the **Azure subscription** dropdown list, select the Azure subscription you used for the **Canary Environment** stage, shown under **Available Azure Service connections**, as we already created the service connection before when authorizing the subscription use.
14. In the **App Service name** dropdown list, select the name of the **Prod** web app.
15. Select the Task **Deploy Azure App Service**. In the **Package or Folder** field, update the default value of "$(System.DefaultWorkingDirectory)/**/*.zip" to "$(System.DefaultWorkingDirectory)/**/Web.zip"
16. On the **All pipelines > New Release Pipeline** pane, click **Save** and, in the **Save** dialog box, click **OK**.

You have now successfully configured the Release Pipeline.

1. In the browser window displaying the **eShopOnWeb** project, in the vertical navigational pane, in the **Pipelines** section, click **Pipelines**.

2. On the **Pipelines** pane, click the entry representing **eShopOnWeb** build pipeline and then, on the **eShopOnWeb** pane, click on **Run Pipeline**.
3. On the **Run pipeline** pane, accept the default settings and click **Run** to trigger the pipeline. **Wait for the build pipeline to finish**.

   Note: After the build succeeds, the release will be triggered automatically and the application will be deployed to both the environments. Validate the release actions, once the build pipeline completed successfully.

4. In the vertical navigational pane, in the **Pipelines** section, click **Releases** and, on the **eShopOnWeb** pane, click the entry representing the most recent release.
5. On the **eShopOnWeb > Release-1** blade, track the progress of the release and verify that the deployment to both web apps completed successfully.
6. Switch to the Azure portal interface, navigate to the resource group **DevOpsl08-RG**, in the list of resources, click the **Canary** web app, on the web app blade, click **Browse**, and verify that the web page (E-commerce website) loads successfully in a new web browser tab.
7. Switch back to the Azure portal interface, this time navigating to the resource group **DevOpsl08-RG**, in the list of resources, click the **Production** web app, on the web app blade, click **Browse**, and verify that the web page loads successfully in a new web browser tab.
8. Close the web browser tab displaying the **EShopOnWeb** web site.

Exercise 4: Configure release gates

In this exercise, you will set up Quality Gates in the release pipeline.

Task 1: Configure pre-deployment gates for approvals

In this task, you will configure pre-deployment gates.

1. Switch to the web browser window displaying the Azure DevOps portal, and open the **eShopOnWeb** project. In the vertical navigational pane, in the **Pipelines** section, click **Releases** and, on the **New Release Pipeline** pane, click **Edit**.
2. On the **All pipelines > New Release Pipeline** pane, on the left edge of the rectangle representing the **Canary Environment** stage, click the oval shape representing the **Pre-deployment conditions**.
3. On **Pre-deployment conditions** pane, set the **Pre-deployment approvals** slider to **Enabled** and, in the **Approvers** text box, type and select your Azure DevOps account name.

4. **Save** the pre-approval settings and close the popup window.
5. Click **Create Release** and confirm by pressing the **Create** button from the popup window.
6. Notice the green confirmation message, saying "Release-2" has been created. Click the link of "Release-2" to navigate to its details.
7. Notice the **Canary** Stage is in a **Pending Approval** state. Click the **Approve** button. This sets off the Canary Stage again.

Task 2: Configure post-deployment gates for Azure Monitor

In this task, you will enable the post-deployment gate for the Canary Environment.

1. Back on the **All pipelines > New Release Pipeline** pane, on the right edge of the rectangle representing the **Canary Environment** stage, click the oval shape representing the **Post-deployment conditions**.
2. On **Post-deployment conditions** pane, set the **Gates** slider to **Enabled**, click **+ Add**, and, in the pop-up menu, click **Query Azure Monitor Alerts**.
3. On **Post-deployment conditions** pane, in the **Query Azure Monitor Alerts** section, in the **Azure subscription** dropdown list, select the **service connection** entry representing the connection to your Azure subscription, and, in the **Resource group** dropdown list, select the **DevOpsl08-RG** entry.
4. On the **Post-deployment conditions** pane, expand the **Advanced** section and configure the following options:

- Filter type: **None**
- Severity: **Sev0, Sev1, Sev2, Sev3, Sev4**
- Time Range: **Past Hour**
- Alert State: **Acknowledged, New**
- Monitor Condition: **Fired**

1. On **Post-deployment conditions** pane, expand the **Evaluation options** and configure the following options:

- Set the value of **Time between re-evaluation of gates** to **5 Minutes**.
- Set the value of **Timeout after which gates fail** to **8 Minutes**.
- Select the **On successful gates, ask for approvals** option.

Note: The sampling interval and timeout work together so that the gates will call their functions at suitable intervals and reject the deployment if they don't succeed during the same sampling interval within the timeout period.

1. Close the **Post-deployment conditions** pane, by clicking the **x** mark in its upper right corner.
2. Back on the **New Release Pipeline** pane, click **Save**, and in the **Save** dialog box, click **OK**.

Exercise 5: Test release gates

In this exercise, you will test the release gates by updating the application, which will trigger a deployment.

Task 1: Update and deploy application after adding release gates

In this task, you will first generate some alerts for the Canary Web App, followed by tracking the release process with the release gates enabled.

1. From the Azure Portal, browse to the **Canary Web App** Resource deployed earlier.
2. From the Overview pane, notice the **URL** field showing the Hyperlink of the web application. Click this link, which redirects you to the EShopOnWeb web application in the browser.
3. To simulate a **Failed Request**, add **/discount** to the URL, which will result in an error message, since that page does not exist. Refresh this page several times to generate multiple events.
4. From the Azure Portal, in the "Search resources, services and docs" field, enter **Application Insights** and select the **Canary-AppInsights** Resource created in the previous exercise. Next, navigate to **Alerts**.
5. There should be at least **1** new alert in the list of results, having a **Severity 2** enter **Alerts** to open the Alerts Service of Azure Monitor.
6. Notice there should be at least **1** Failed_Alert** with **Severity 2 - Warning** showing up in the list. This got trigger when you validated the non-existing website URL address in the previous exercise.

   ** Note:** If no Alert shows up yet, wait another few minutes.

7. Return back to the Azure DevOps Portal, open the **EShopOnWeb-Release Gates** Project. Navigate to **Pipelines**, select **Releases** and select the **New Release Pipeline**.
8. Click the **Create Release** button.
9. Wait for the Release pipeline to kick off, and **approve** the Canary Stage release action.

10. Wait for the Canary release Stage to complete successfully. Notice how the **Post-deployment Gates** is switching to an **Evaluation Gates** status. Click the **Evaluation Gates** icon.
11. For the **Query Azure Monitor Alerts**, notice an initial failed state.
12. Let the Release pipeline in a pending state for the next 5 minutes. After the 5 minutes did pass, notice the 2nd evaluation failing again.
13. This is expected behavior, since there is an Application Insights Alerts triggered for the Canary Web App.

    Note: Since there is an alert triggered by the exception, **Query Azure Monitor** gate will fail. This, in turn, will prevent deployment to the **Production** environment.

14. Wait another 3 minutes and validate the status of the Release Gates again. As it is now +8 minutes after the initial Release Gates got checked, and it's been more than 8 minutes since the initial Application Insight Alert got triggered with action "Fired", it should result in a successful Release Gate, having allowed the deployment of the Production Release Stage as well.

Exercise 6: Remove the Azure lab resources

In this exercise, you will remove the Azure resources provisioned in this lab to eliminate unexpected charges.

Note: Remember to remove any newly created Azure resources that you no longer use. Removing unused resources ensures you will not see unexpected charges.

Task 1: Remove the Azure lab resources

In this task, you will use Azure Cloud Shell to remove the Azure resources provisione in this lab to eliminate unnecessary charges.

1. In the Azure portal, open the **Bash** shell session within the **Cloud Shell** pane.
2. List all resource groups created throughout the labs of this module by running the following command:

```
 az group list --query "[?starts_with(name,'DevOps108-RG')].name" --output tsv
```

3. Delete all resource groups you created throughout the labs of this module by running the following command:

```
 az group list --query "[?starts_with(name,'DevOps108-RG')].[name]" --output
tsv | xargs -L1 bash -c 'az group delete --name $0 --no-wait --yes'
```

Note: The command executes asynchronously (as determined by the –nowait parameter), so while you will be able to run another Azure CLI command immediately afterwards within the same Bash session, it will take a few minutes before the resource groups are actually removed.