Student Name: **Weight: 3%**

Student ID: **Marks: /10**

Lab: Using Azure Cost Management Tools

Lab Objectives

In this lab you will be learning how to use the Azure cost management tools and organize your Azure resources efficiently. You will:

1. Create a resource group.
2. Apply a resource lock.
3. Create a resource tag.
4. Apply a policy to a subscription.
5. View a policy in JSON format.
6. View an initiative.
7. Create and assign a blueprint.
8. View Azure Cost Management tools.

Lab Requirements

- Up to date web browser
- Azure account

Instructions

1. Working individually, follow the procedure below.
2. Take screenshots, as described in the *Marking Criteria* section.
3. Create a document that includes all screenshots appropriately titled and described, and then upload it to Brightspace, as indicated by your instructor.

Marking Criteria

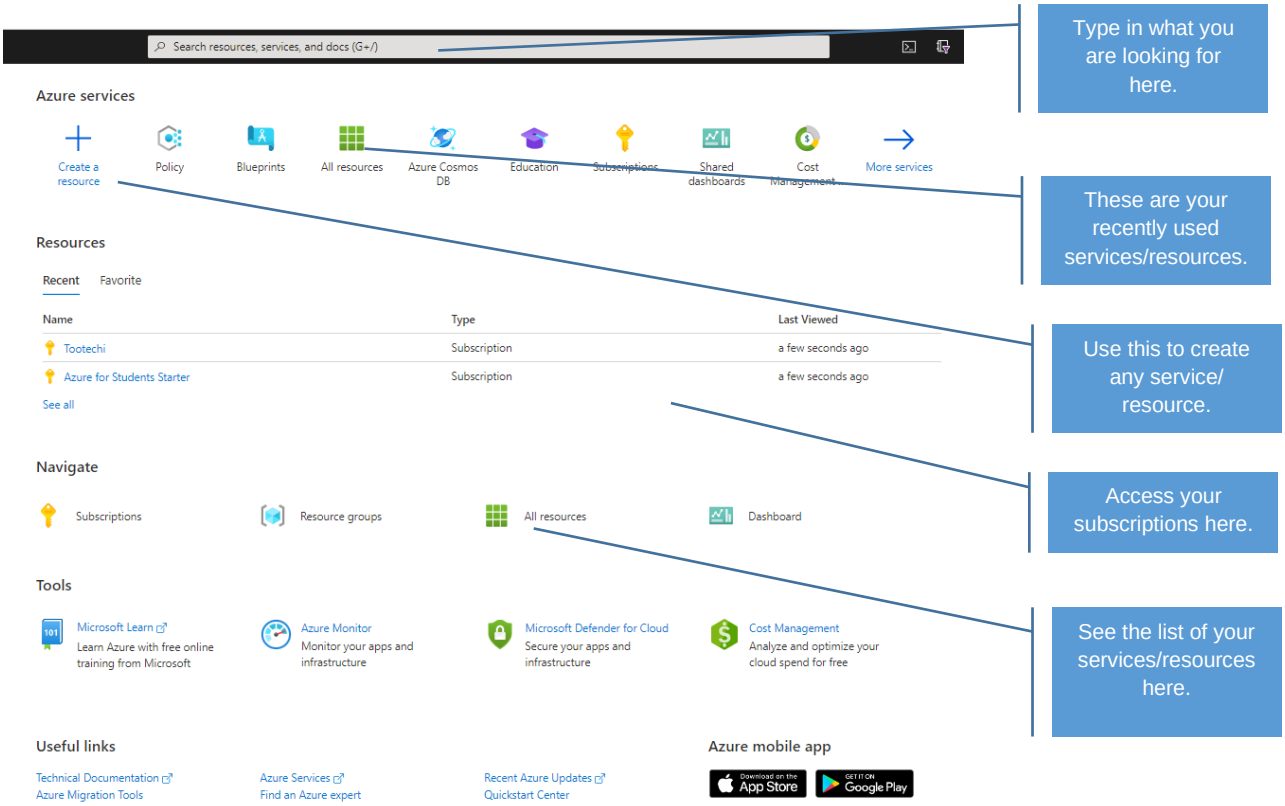
Screenshots	Marks
Full resource group page with error message saying that the resource group is locked and cannot be deleted	/2
Resources with a ‘Tag: Team Orange’ page	/2
Require a tag on resource groups policy compliance page	/2
Published, versioned blueprint details	/2
Budget and Alert with the following criteria: • Filter = Billing Period • Reset Period = Monthly • Creation/Expiration dates over the next 2 years • Amount = $500 • Alert Condition = Actual 80% • Your email address	/2
Total	**/10**

Note: This icon indicates when a screenshot is required.

Source: Flatiron.com, Freepik, Image: screenshot_983871

Navigating in Azure

Once you have logged in to the Azure portal, you see your home page.



Note: These labs show you only one of the many ways to navigate and access the various tools and services in Azure as you learn the configurations. Over time, you will discover what suits you best.

Procedure

Part 1: Create a Resource Group

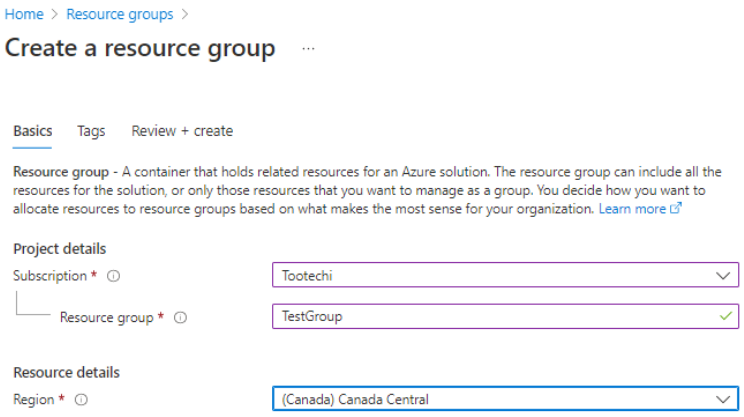
A resource group is a container used to help you organize your resources.

☐ Navigate to the **Resource Groups** menu and click **Create**.

☐ Select your subscription and enter the name and location of your resource group.

Resource groups have the following rules:

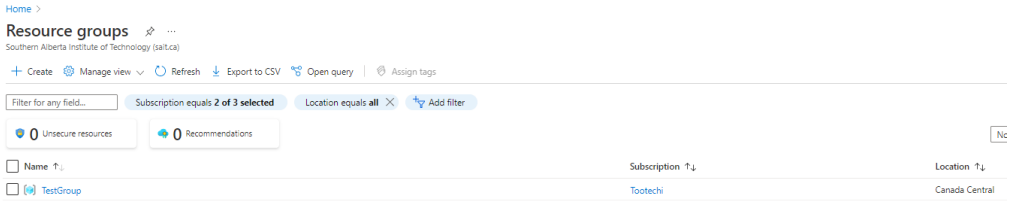
- You cannot nest resource groups.
- The resource and the resource group do not have to be in the same location.
- Resources can only belong to one group.
- You can move resources to a different group.
- The resource metadata is stored in the group location.
- All resources must belong to a resource group.
- Resource groups are free.



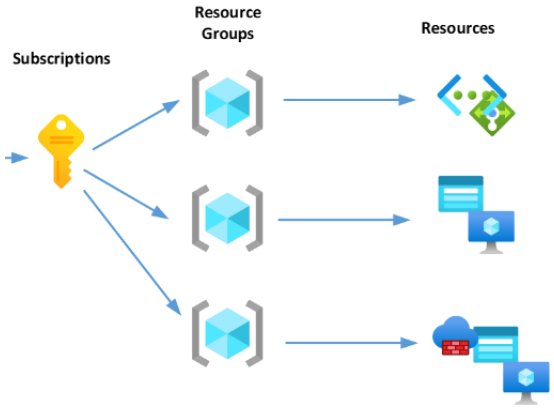
☐ Click **Next** twice.

☐ Review your information, and then click **Create**.

You should now be able to see your resource group, its subscription and its location.



You can create multiple resource groups in a subscription and put multiple resources in a resource group.



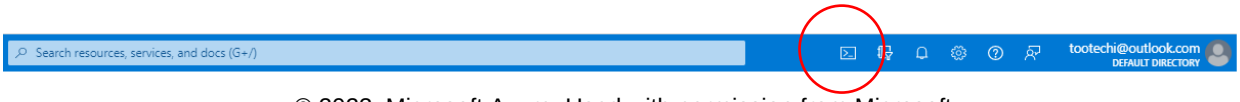
There are several ways to create resources in Azure:

- The Azure Portal
- ARM
- Azure Cloud Shell
    - PowerShell
    - Bash CLI
- BICEP
- SDKs
- VS code

Azure Cloud Shell has the following rules:

- It runs on a temporary host provided on a per-session, per-user basis.
- It times out after 20 minutes without interactive activity.
- It requires an Azure file share to be mounted.
- It uses the same Azure file share for both Bash and PowerShell.
- It is assigned one machine per user account
- It persists using a 5-GB image held in your file share
- Permissions are set as a regular Linux user in Bash
- The machine hosting Cloud Shell is free, with a pre-requisite of a mounted Azure Files share. Regular storage costs apply.

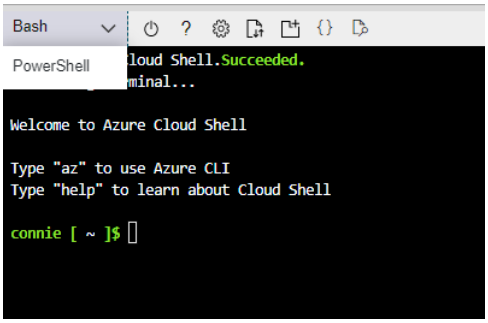
☐ To open Azure Cloud Shell, click the icon at the top-right of the screen next to your account icon.



A window appears at the bottom of the screen with a message that you have no storage mounted.

☐ Click the **Create Storage** button.

After a few moments to create the necessary resources to use the shell, a command prompt appears. You can use the left-hand corner drop-down menu to select either Bash or PowerShell.



☐ Select **Bash**.

An Azure resource group must be created in a region.

☐ To see a list of regions in Bash, use the following command:

```
az account list-locations
```

☐ Create a group named bashgroup in the Canada central region using the following command:

```
az group create --name bashgroup --location canadacentral
```

☐ Check that the group was properly created in the *Resource Groups* page in the portal.

☐ Switch to the PowerShell CLI.

☐ Get a list of regions in PowerShell using the following command:

```
Get-AzLocation
```

☐ Create a group named powergroup in the Canada central region using the following command:

```
New-AzResourceGroup –Name powergroup –Location “Canada Central”
```

☐ Check that the group was properly created in the *Resource Groups* page in the portal.

Note: It may take a few moments for the group to be created and you may have to refresh the screen.

Part 2: Apply a Resource Lock

Once you have created a resource, you may want to ensure that it can't be accidentally deleted or that only certain users can edit the resource.

Azure has two types of resource locks:

- CanNotDelete – authorized users can read or edit the resource but can't delete it
- ReadOnly – authorized users cannot edit or delete the resource

Resource locks can be applied to:

- A subscription
- A resource group
- A resource

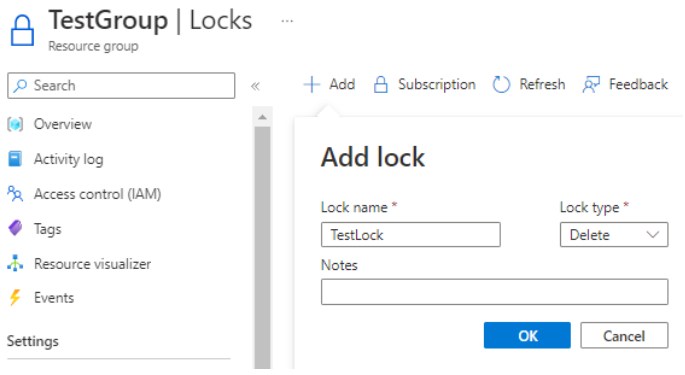
Resource locks have the following rules:

- A resource lock will not block the cancellation of a subscription
- Locks are inherited
- If there are multiple locks, the most restrictive lock will apply
- You must have the appropriate permissions to apply a lock to a resource

☐ From the **Resource Groups** menu, click the **TestGroup** you created.

☐ From the **TestGroup** blade, select **Locks**.

☐ Give your lock a name, select **Delete** for the lock type and click **OK**.



You should now see your lock, its type and its scope.

☐ To see your Resource group with the lock in PowerShell use the following command:

```
Get-AzResourceGroup powergroup
```

☐ To see the resource lock on a resource group, use the following command:

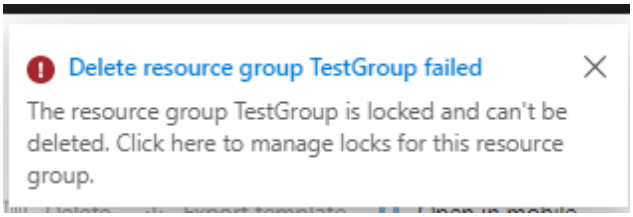
```
Get-AzResourceLock -ResourceGroupName testgroup
```

☐ Return to your **Resource Groups > TestGroup** menu and select **Delete Resource Group**.

A window appears asking if you are sure you want to do this.

☐ Type the name of the resource to confirm your selection and click **OK**.

An error message appears telling you that this function failed.



☐ Remove the resource lock and delete the resource group.

Note: Deleting a resource can take some time, so the group may appear to exist in the menus for a while.

Part 3: Create a Resource Tag

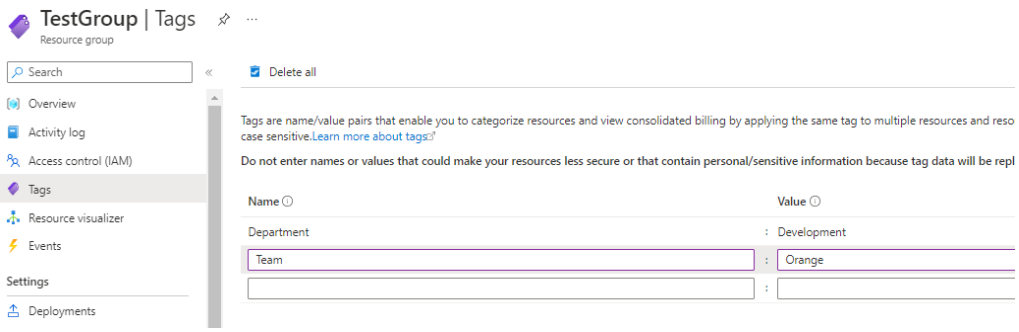
Tags are a key/value pair that help you organize and identify your resources in different ways.

☐ Create another resource group and go to its page.

☐ Click **Tags** on the blade.

Let's assume that your company has several departments with teams that consist of various people throughout the organization.

☐ Add a Department and Team tags to your resource group.



☐ Create another resource group with the following tags:

- Department = Test
- Team = Orange

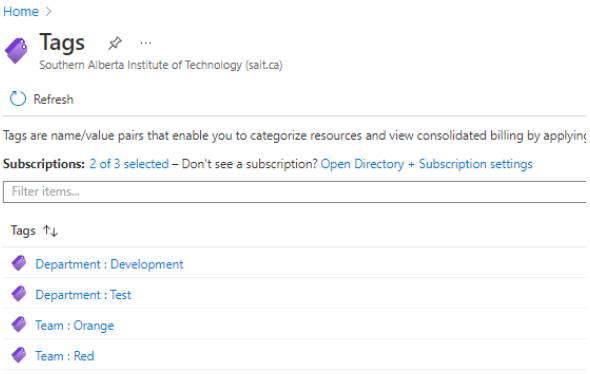
Notice that when you create the second set of tags you can choose *Department* and *Team* from the drop-down menu and just fill in the value.

☐ Create another resource group with the following tags:

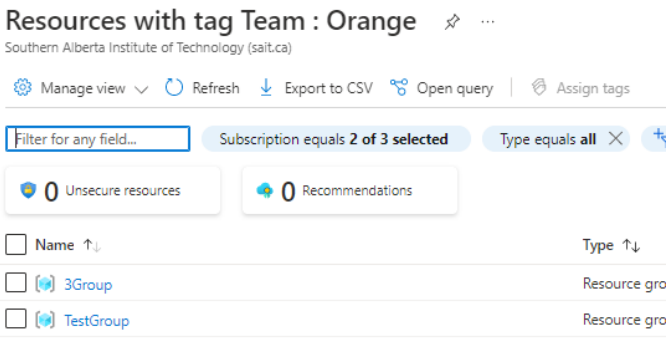
- Department = Development
- Team = Red

☐ Type *Tags* in the search bar and go to the **Tags** menu.

You'll see a list of the tags you've created and their values.



☐ Select a tag or search for a tag to see all the resources with that tag.



☐ To see your resource tags in PowerShell, use the following command:

```
Get-AzTag
```

Part 4: Apply a Policy to a Subscription

Azure Policy service is a free resource that helps you ensure that your resources are configured to meet your business rules or SLAs (service-level agreements).

Policies can be applied to (scopes):

- Resources
- Resource groups
- Subscriptions

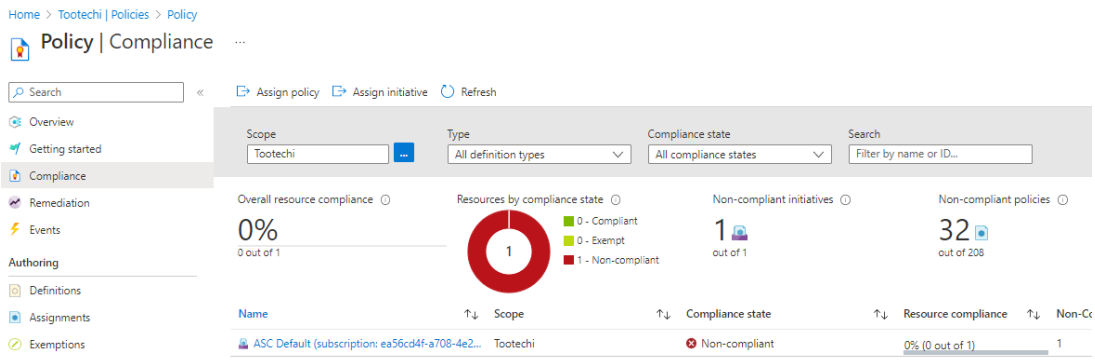
The rules of policies are as follows:

- Policies are inherited.
- You can make exceptions in an inheritance.
- Policies are only available with premium subscriptions.
- There are built-in policies or you can create custom policies.
- By default, policies only apply to a new resource so you must run remediation to apply them to existing resources.

☐ Create a resource group with no tags.

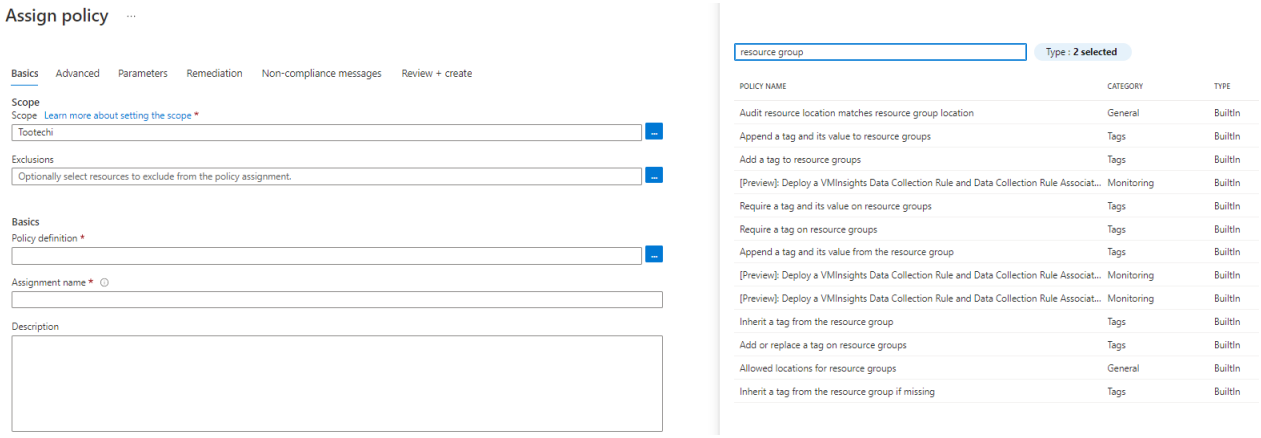
☐ Navigate to the **Policies** service and select **Overview** in the blade.

What you see depends on your subscription type and current conditions. In the example below, there is one policy (ASC Default), and there one resource that is out of compliance with that policy.



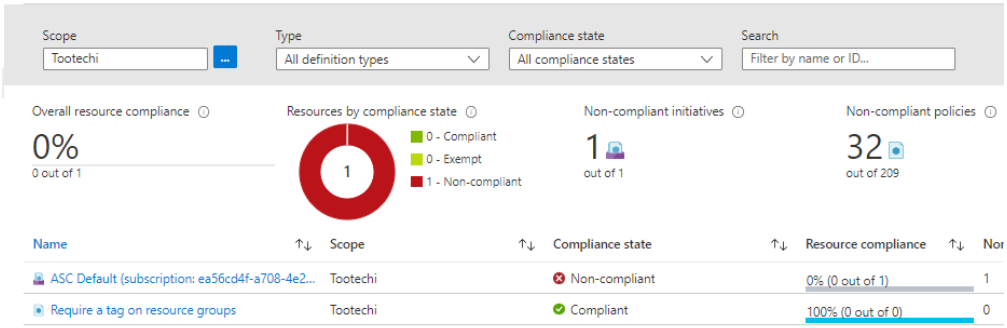
- ☐ Select **Compliance** from the **Policies** blade, and then select **Assign Policy**.
- ☐ Enter your subscription into the scope and notice (but do not change) that you can set exceptions below.
- ☐ In the *Policy Definition* section, click the kebab (3 dots) on the right-hand side.

  A list appears showing all the built-in policies that you can choose from.
- ☐ Type **resource group** into the search box.



- ☐ Select **Require a tag on resource groups** and click **Add**.
- ☐ Select **Parameters** on the top menu and type **Department** in the tag name.
- ☐ Select **Non-compliance messages** on the top menu and create a message (e.g., This resource group does not have a department tag).
- ☐ Click **Review + Create** and then create the policy.

  You should now see your policy.



Notice that the Compliance state says that you are compliant but it is for 0 out of 0 resources because the policy only applies to new resources. Clicking the policy tells you that the resource group you created without tags is non-compliant.

☐ Try to create another resource group without a tag.

It will fail to create, and the error details state that it is not allowed by policy.

☐ Create the resource group again but this time add the department tag.

The group will create properly.

Part 5: View a Policy in JSON Format

JSON (JavaScript Object Notation) is a format for storing and transmitting data. Azure Policies is one of the services that is stored in JSON format.

☐ Go to the **Policies** menu and select **Authoring** > **Assignments** in the blade.

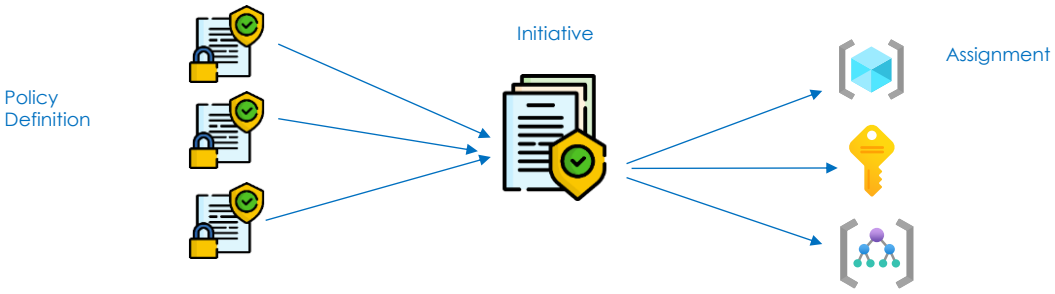
☐ Click the policy you created and select **View Definition**.

The JSON code for the policy you created in the GUI appears. You can create and modify policies with JSON.

☐ Look through the format for information like *effect* and *field*. You will see more JSON in further units.

Part 6: View an Initiative

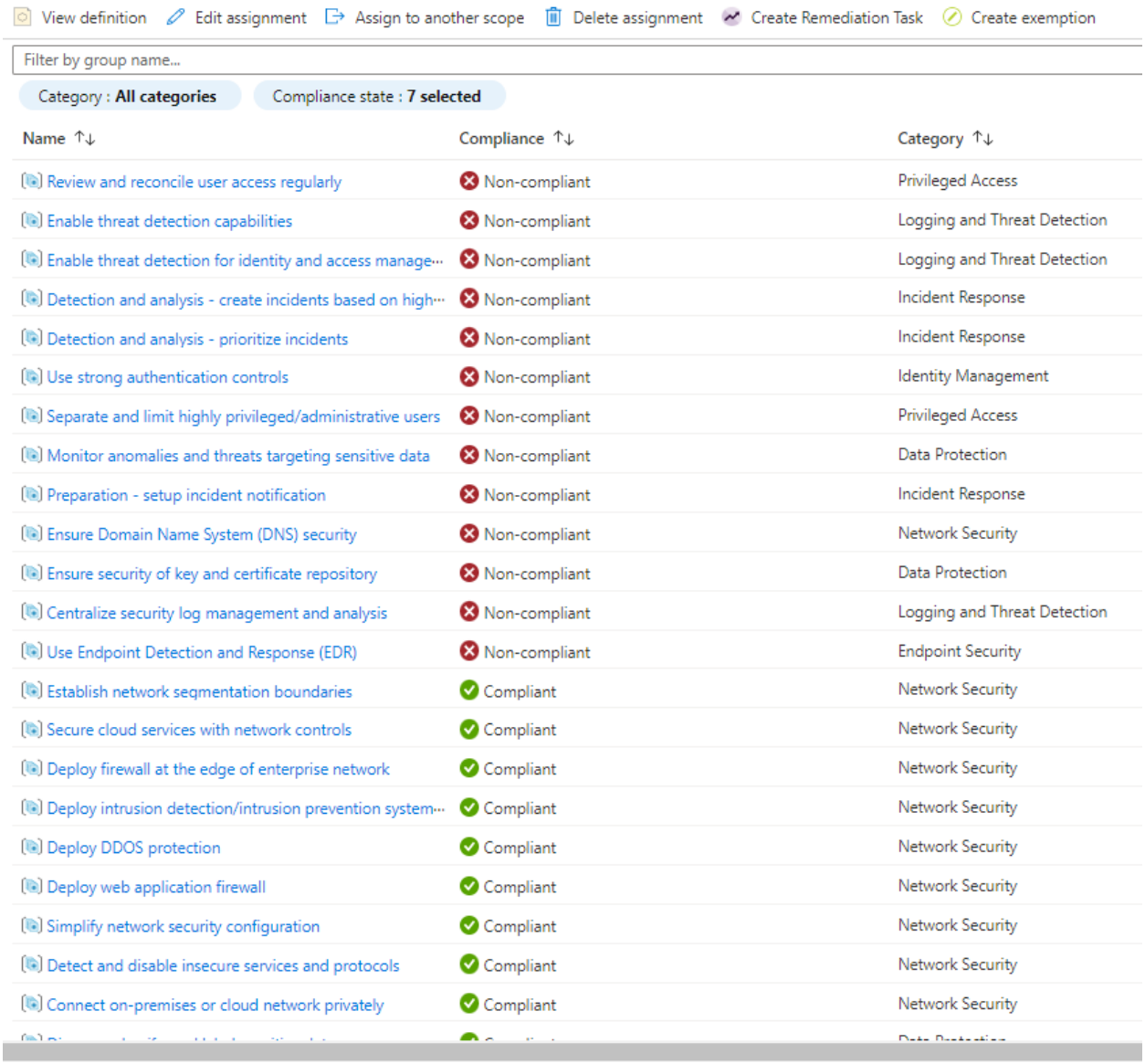
A collection of policies is called an initiative. Grouping policies allows you to organize your business goals. For example, you could create an initiative that includes all your billing policies and then assign it to a subscription.



- ☐ Go to the **Policies** menu and select **Compliance** in the blade.
- ☐ Select **Assign Initiative**.
- ☐ Select your subscription as the scope and click the **Initiative Definition** kebab.
- ☐ Type *Canada* into the initiative search box.

  Notice that there is already a collection of policies called the *Canada Federal PBMM*.
- ☐ Hover over the initiative to see a brief description. Read the details at: [Details of the Canada Federal PBMM Regulatory Compliance built-in initiative](https://learn.microsoft.com/en-us/azure/governance/policy/samples/canada-federal-pbmm) (https://learn.microsoft.com/en-us/azure/governance/policy/samples/canada-federal-pbmm).
- ☐ Return to the **Policies > Compliance** blade. Depending on your subscription type, you may have an ASC default initiative.
- ☐ Click the initiative and select **Policies** in the top menu to see a list of the policies included in this initiative.

  Note: You can click any policy to see the details of that policy.



Part 7: Create and Assign a Blueprint

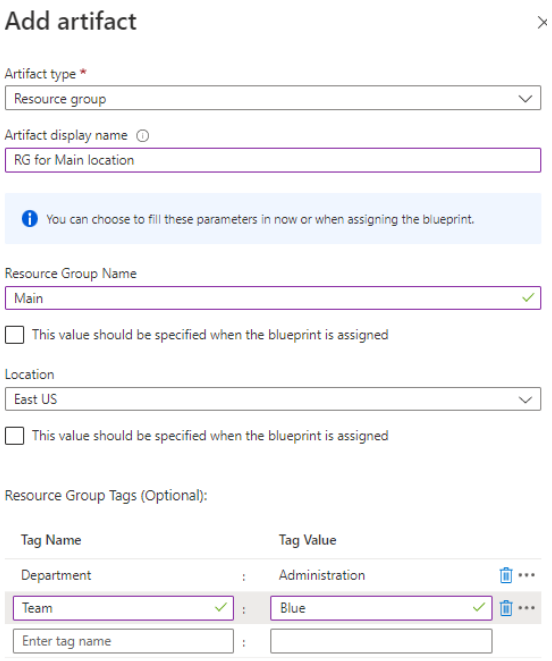
Azure Blueprints allows you to create a package of roles, policies, resource groups and resource templates that you can deploy many times. For example, assume you have created a test environment that consists of several virtual machines with networking and some storage, and then you put them all in several resource groups and apply security policies. You can use this setup to create a blueprint and then deploy the complete environment with only a few clicks every time you need to run a test.

- ☐ Read: Overview of the Azure Security Benchmark Foundation blueprint sample (https://learn.microsoft.com/en-us/azure/governance/blueprints/samples/azure-security-benchmark-foundation/).
- ☐ From your home page, type **Blueprints** in the search box and go to the **Blueprints** menu.
- ☐ Select **Blueprint Definitions** in the blade and click **Create Blueprint**.

  A list of blueprint examples appears.
- ☐ Click the **CAF Foundations** blueprint.
- ☐ In the **Basics** menu, give your blueprint a name and select **Definition location** as your subscription.
- ☐ Click **Artifacts** in the top menu and notice the components that make up the sample blueprint.

  Note: Click the kebab for each artifact to remove it or edit it.
- ☐ Click the **Allowed Locations** artifact.
- ☐ Remove the checkmark from *This value should be specified when the blueprint is assigned.*
- ☐ Select **Canada Central** in the **Allowed Locations** and save it.

  Note: If you deployed this blueprint, it would have a policy that only allowed resources to be created in the Canada Central region.
- ☐ In the **Azure Subscription** section, click **Add Artifact**.
- ☐ Go back to the **Blueprints** menu and click **Create a Blueprint**.
- ☐ Select **Start with a blank blueprint**.
- ☐ Give your blueprint a name and a description, and then select your subscription as the **Definition location**.
- ☐ Click **Next** and then **Add artifact**.
- ☐ Fill out the following information and add the artifact.



Note: If you wanted to add a virtual machine artifact to this blueprint, you'd need a template for that virtual machine. Templates will be covered later in the course.

- ☐ Add a second resource group artifact.
- ☐ Save the blueprint draft.
- ☐ Go back to the **Blueprints** menu and select **Blueprint Definitions** on the blade.
- ☐ Go back to the **Blueprints** menu and select **Getting Started** on the blade.
- ☐ Select **Apply to a Scope** and then click the kebab beside your blueprint.
- ☐ Click **Publish Blueprint** and give your blueprint a version.

Now you have a published, versioned blueprint that you can update and use repeatedly. The last step is to assign the blueprint.

- ☐ Go back to the **Blueprints** menu and select **Blueprint Definitions** on the blade.
- ☐ From the kebab beside your blueprint, select **Assign Blueprint**.
- ☐ Read through the options and click **Assign**.

☐ Wait for the message that your blueprint has succeeded and then check your resource groups.

Note: It can take several minutes before the resources show up in the portal. Don't forget to refresh.

Part 8: View Azure Cost Management Tools

Azure Cost Management is a free service, but which features are available may depend on the type of subscription you have. Azure has several cost management tools:

- Azure cost analysis – this tool allows you to see your current costs in total or by service, location or resource group. It also provides cost forecasts based on your current usage.
- Azure cost alerts and Azure budgets – these tools allow you to set cost thresholds, send alerts, track spending and trigger functions.
- Advisor recommendations – this tool analyzes your resource configurations and provides recommendations for cost savings, security, reliability and performance. This tool will be addressed later in the course.

Right now, you only have free resources, so there is no cost data available. However, you can still see how the tools function.

☐ Complete the tutorial: Quickstart: Start using Cost analysis (https://learn.microsoft.com/en-us/azure/cost-management-billing/costs/quick-acm-cost-analysis).

☐ Complete the tutorial: Create and manage Azure budgets (https://learn.microsoft.com/en-us/azure/cost-management-billing/costs/quick-acm-cost-analysis).

Resources

- Details of the Canada Federal PBMM Regulatory Compliance built-in initiative (https://learn.microsoft.com/en-us/azure/governance/policy/samples/canada-federal-pbmm)

- Overview of the Azure Security Benchmark Foundation blueprint sample (https://learn.microsoft.com/en-us/azure/governance/blueprints/samples/azure-security-benchmark-foundation/)