Deploying Azure Resources Using Bicep

Introduction to Bicep



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Overview



What are ARM templates?

How is Bicep different from JSON based ARM?

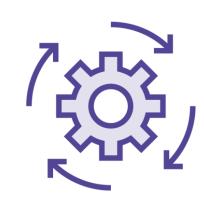
Authoring and deploying simple Bicep files



What Are Azure Resource Manager (ARM) Templates?



Modular JSON Files with declarative Syntax for Infrastructure as Code



Intelligent Orchestration



Desired State of Resources and their Properties



Testing and Preview



Any Azure Resource



Full CI/CD and Tracking Support



```
"$schema": "https://schema.management.azure.com/
           schemas/2019-04-01/deploymentTemplate.json#",
"contentVersion": "1.0.0.0",
"parameters": {},
"variables": {},
"resources": [],
"outputs": {}
```

- ◆ Provide values during deployment that allow the same template to be used with different environments.
- Define values that are reused in your templates. They can be constructed from parameter values.
- Specify the resources to deploy.
- Return values from the deployed resources.

```
"$schema": "https://schema.management...",
  "contentVersion": "1.0.0.0",
"resources": [
    "type": "Microsoft.Storage/storageAccounts",
    "apiVersion": "2019-04-01",
    "name": "mystorageaccount",
    "location": "westus",
    "sku": {
      "name": "Standard_LRS"
   },
    "kind": "StorageV2",
    "properties": {}
```

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    "location": "westus",
    "sku": {
      "name": "Standard_LRS"
    "kind": "StorageV2",
    "properties": {}
```

```
"$schema": "https://schema.management...",
"contentVersion": "1.0.0.0",
"parameters": {
 "storageAccountType": {
  "type": "string",
  "defaultValue": "Standard LRS",
  "allowedValues": [
   "Standard LRS",
   "Standard GRS",
   "Standard_ZRS",
   "Premium LRS"
  "metadata": {
   "description": "Storage Account type"
  "resources": [
     "type": "Microsoft.Storage/storageAccounts",
     "apiVersion": "2019-06-01",
     "name": "mystorageaccount",
     "location": "westus",
     "sku": {
     "name": "[parameters('storageAccountType')]"
  "kind": "StorageV2",
  "properties": {}
```

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    "apiVersion": "2019-04-01",
    "name": "mystorageaccount",
    "location": "westus",
    "sku": {
      "name": "Standard_LRS"
    "kind": "StorageV2",
    "properties": {}
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"contentVersion": "1.0.0.0",
"parameters": {
 "storageAccountType": {
  "type": "string",
  "defaultValue": "Standard LRS",
  "allowedValues": [
   "Standard LRS",
   "Standard GRS",
   "Standard ZRS",
   "Premium LRS"
  "metadata": {
   "description": "Storage Account type"
  "resources": [
     "type": "Microsoft.Storage/storageAccounts",
     "apiVersion": "2019-06-01",
     "name": "mystorageaccount",
     "location": "westus",
     "sku": {
     "name": "[parameters('storageAccountType')]"
  "kind": "StorageV2",
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    "location": "westus",
    "sku": {
      "name": "Standard_LRS"
    "kind": "StorageV2",
    "properties": {}
```

```
"$schema": "https://schema.management...",
"contentVersion": "1.0.0.0",
"parameters": {
 "location": {
  "type": "string",
  "defaultValue": "[resourceGroup().location]",
  "metadata": {
   "description": "Location for all resources."
  "resources": [
    "type": "Microsoft.Storage/storageAccounts",
    "apiVersion": "2019-06-01",
    "name": "mystorageaccount",
    "location": "[parameters('location')]",
    "sku": {
     "name": "[parameters('storageAccountType')]"
    "kind": "StorageV2",
    "properties": {}
```



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  "defaultValue": "[resourceGroup().location]",
  "metadata": {
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  "resources": [
    "type": "Microsoft.Storage/storageAccounts",
    "apiVersion": "2019-06-01",
    "name": "mystorageaccount",
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    "name": "mystorageaccount",
    "location": "westus",
    "sku": {
      "name": "Standard_LRS"
    "kind": "StorageV2",
    "properties": {}
```

```
"$schema": "https://schema.management...",
"contentVersion": "1.0.0.0",
"parameters": {
"variables": {
 "storageAccountName": "[concat('store', uniquestring(resourceGroup().id))]"
  "resources": [
    "type": "Microsoft.Storage/storageAccounts",
    "apiVersion": "2019-06-01",
    "name": "[variables('storageAccountName')]",
    "location": "[parameters('location')]",
    "sku": {
     "name": "[parameters('storageAccountType')]"
    "kind": "StorageV2",
    "properties": {}
```

```
"$schema": "https://schema.management...",
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    "sku": {
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"$schema": "https://schema.management...",
"contentVersion": "1.0.0.0",
"parameters": {
"variables": {
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  "resources": [
    "type": "Microsoft.Storage/storageAccounts",
    "apiVersion": "2019-06-01",
    "name": "[variables('storageAccountName')]",
    "location": "[parameters('location')]",
    "sku": {
     "name": "[parameters('storageAccountType')]"
    "kind": "StorageV2",
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      "name": "Standard_LRS"
    "kind": "StorageV2",
    "properties": {}
```

```
"$schema": "https://schema.management...",
"contentVersion": "1.0.0.0",
"parameters": {
"variables": {
  "resources": [
   "outputs": {
   "storageAccountName": {
    "type": "string",
    "value": "[variables('storageAccountName')]"
```



```
"$schema": "https://schema.management...",
  "contentVersion": "1.0.0.0",
"resources": [
    "type": "Microsoft.Storage/storageAccounts",
    "apiVersion": "2019-04-01",
    "name": "mystorageaccount",
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      "name": "Standard_LRS"
    "kind": "StorageV2",
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```

```
"$schema": "https://schema.management...",
"contentVersion": "1.0.0.0",
"parameters": {
  storageAccountType": {
    "type": "string",
    "defaultValue": "Standard_LRS",
    "allowedValues":
      "Standard_LRS"
      "Standard_GRS"
      "Standard_ZRS",
      "Premium_LRS'
    "metadata": {
      "description": "Storage Account type"
  "location": {
    "type": "string",
    "defaultValue": "[resourceGroup().location]",
      "description": "Location for all resources."
  "storageAccountName": "[concat('store', uniquestring(resourceGroup().id))]"
 "resources": [
     "type": "Microsoft.Storage/storageAccounts",
     "apiVersion": "2019-06-01",
     "name": "[variables('storageAccountName')]",
     "location": "[parameters('location')]",
       "name": "[parameters('storageAccountType')]"
     "kind": "StorageV2",
     "properties": {}
"outputs": {
 "storageAccountName": {
   "type": "string",
    "value": "[variables('storageAccountName')]"
```

Possible Scopes

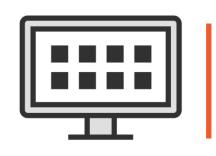




Resource Group



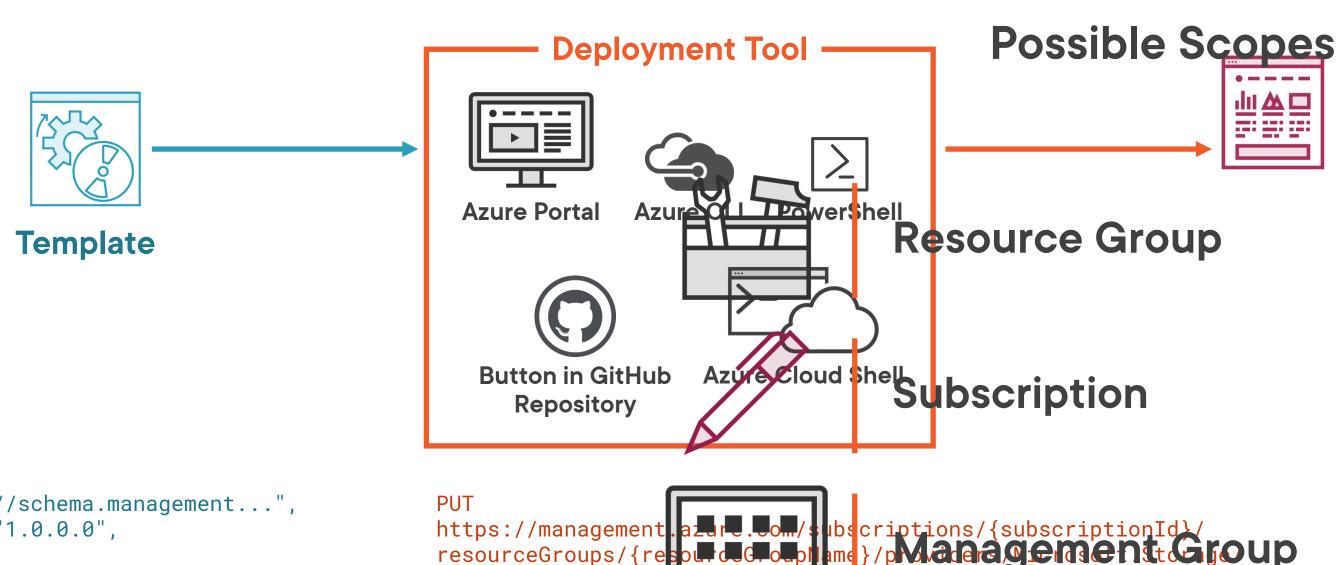
Subscription



Management Group

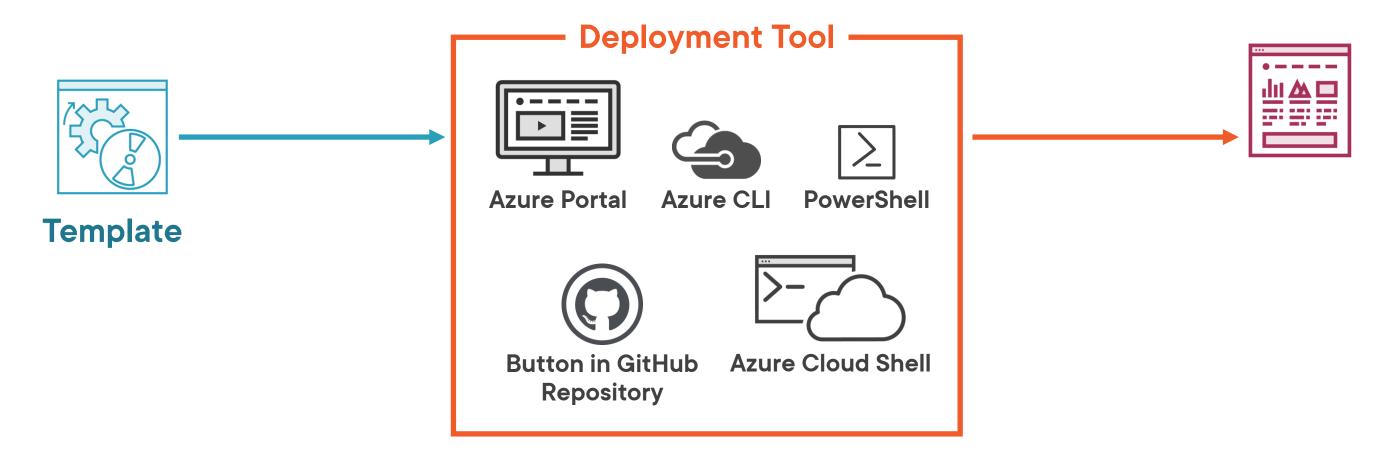


Tenant

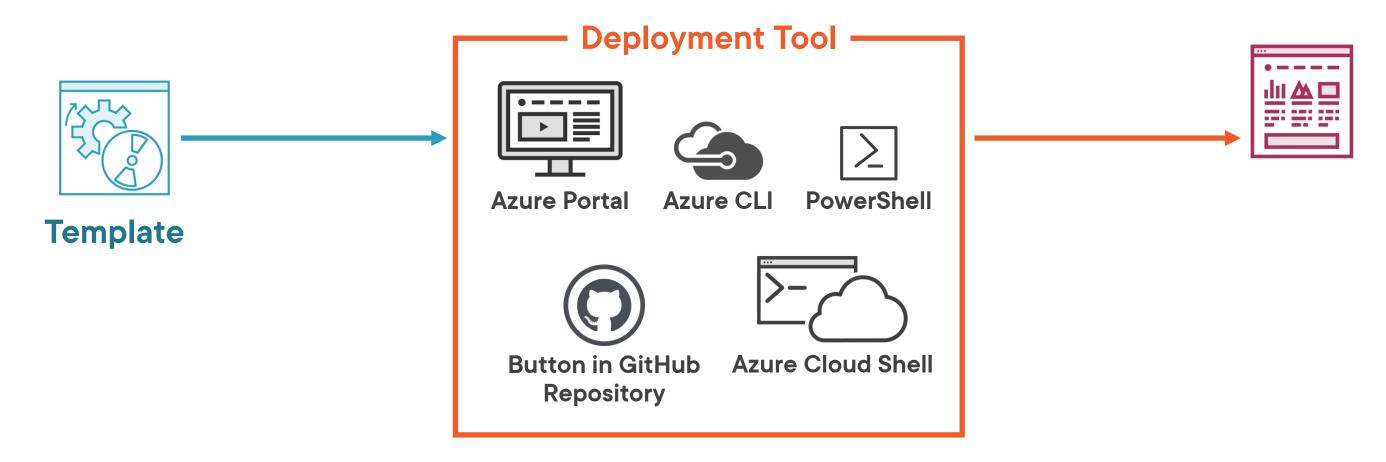


```
PUT
https://management.alerc.com/subscriptions/{subscriptionId}/
resourceGroups/{resourceGroups/{resourceGroups/{pManagement.group}
storageAccounts/mycrorageaccount; api-version=2019-04-01
REQUEST BODY
{
    "location": "westus"
    "sku": {
        "name": "Standard_location"; "Year and a control of the control of the
```



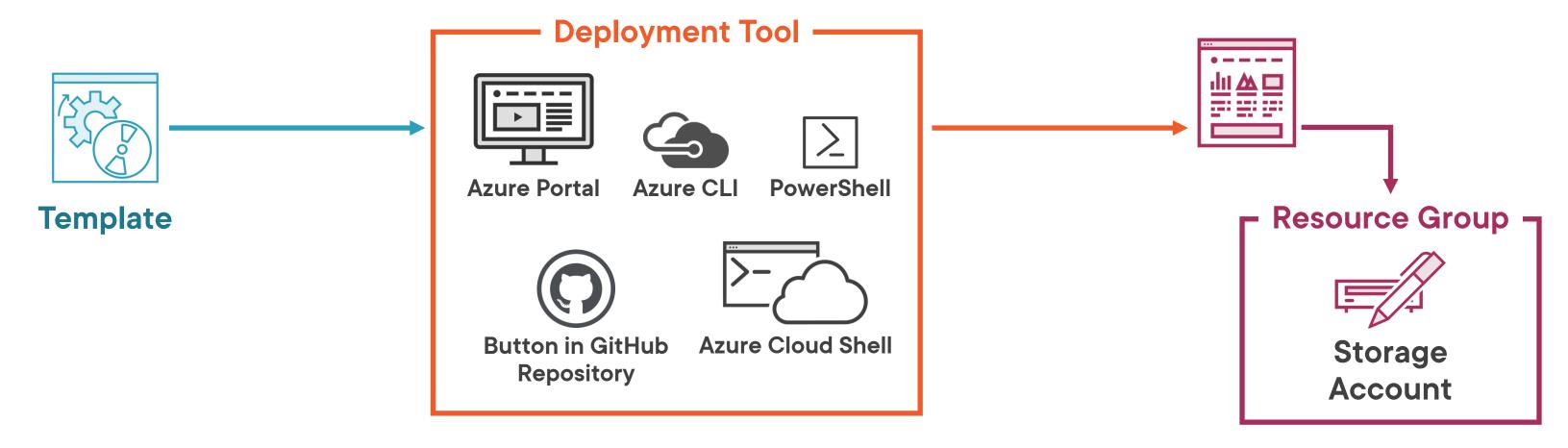


```
PUT
https://management.azure.com/subscriptions/{subscriptionId}/
resourceGroups/{resourceGroupName}/providers/Microsoft.Storage/
storageAccounts/mystorageaccount?api-version=2019-04-01
REQUEST BODY
{
    "location": "westus",
    "sku": {
        "name": "Standard_LRS"
    },
    "kind": "StorageV2",
    "properties": {}
}
```



```
PUT
https://management.azure.com/subscriptions/{subscriptionId}/
resourceGroups/{resourceGroupName}/providers/Microsoft.Storage/
storageAccounts/mystorageaccount?api-version=2019-04-01
REQUEST BODY
{
    "location": "westus",
    "sku": {
        "name": "Standard_LRS"
    },
    "kind": "StorageV2",
    "properties": {}
}
```





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PUT
https://management.azure.com/subscriptions/{subscriptionId}/
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storageAccounts/mystorageaccount?api-version=2019-04-01
REQUEST BODY
{
    "location": "westus",
    "sku": {
        "name": "Standard_LRS"
    },
    "kind": "StorageV2",
    "properties": {}
}
```



What Is Bicep?



Domain Specific Language



Bicep code is transpiled to standard ARM Template JSON files



Focused on Azure resources and tasks



Easier to read and write than standard ARM Template JSON files



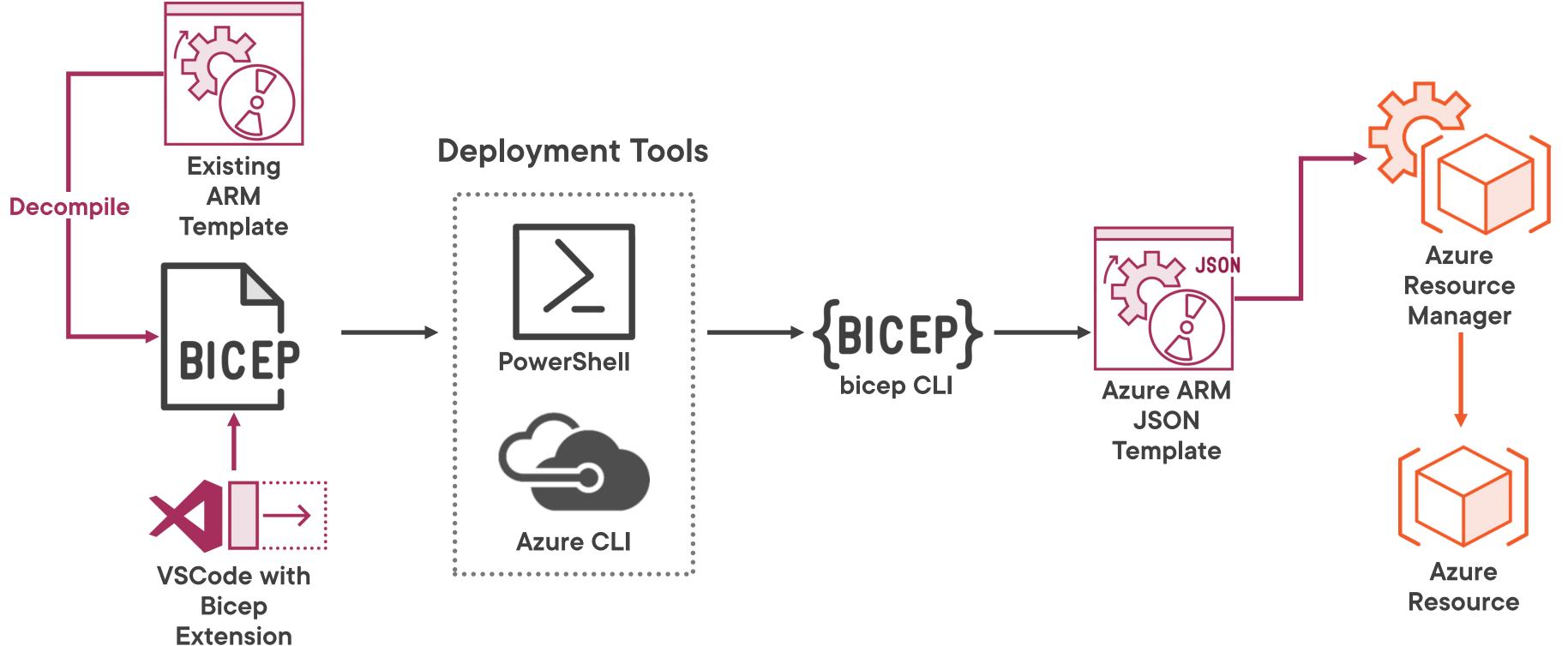
Transparent abstraction over ARM and ARM templates



VS Code Extension with Intellisense and dependency visualization



Bicep Workflow and Tools





Demo



Installing Tools



How Is Bicep Code Different from Standard ARM Template JSON Files?

JSON

```
"parameters": {
    "clusterName": {
      "type": "string",
      "defaultValue": "akscluster"
    "agentCount": {
      "type": "int",
      "defaultValue": 3,
      "minValue": 1,
      "maxValue": 50
    "agentVMSize": {
      "type": "string",
      "defaultValue": "Standard_DS2_v2"
    "sshRSAPublicKey": {
      "type": "string"
```

Bicep

```
param clusterName string = 'akscluster'
@minValue(1)
@maxValue(50)
param agentCount int = 3
param agentVMSize string = 'Standard_DS2_v2'
param sshRSAPublicKey string
```



Contents of a Bicep File

```
param demoParam string = 'Contoso'

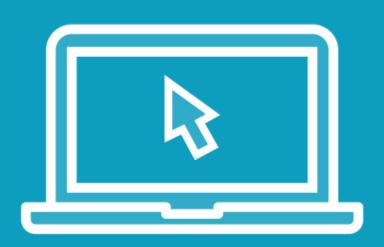
var demoVar = 'example value'

resource demoRes 'type' = { ... }

output demoOutput string = demoRes.name
```

- ◆ Provide values during deployment that allow the same template to be used with different environments.
- Define values that are reused in your templates. They can be constructed from parameter values.
- Specify the resources to deploy.
- Return values from the deployed resources.

Demo



Building and deploying Bicep

- Creating a Bicep file from an ARM template
- Creating a Bicep file from scratch
- Deploying a Bicep file

Summary



Domain specific language for Azure resources

Can deploy any Azure resource

Easier to read and author than JSON based ARM

