Azure Bicep – beyond basics

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Elkhan is a principal cloud architect and 14 times MSFT MCT with experience in cloud solutions, enterprise healthcare systems and healthcare data, and API standards (HL7 FHIR, EDI X12).

He is an active MCT, a Microsoft Tech Community Contributor, Cloud Lunch and Learn Speaker and Team Member, and Azure SME (Architecture, DevOps, Security).

He is a frequent speaker at tech meetups and has volunteered for Give Camps, Azure Data Fest, SQL Saturday, Azure community and Global Azure events.

@ElYusubov

https://theCloudMarathoner.com

ElkhanYusubov

Company Snapshot: T- Rex Is…

- **An Innovative NGIT Provider:** a leading solutions provider of innovative and modernizing Next Generation IT capabilities and enabling skills to the federal government
- **A first to market in migrating large federal mission applications and data** into a citizen-facing public cloud, giving the Company the capabilities and past performance to bid and win future NGIT opportunities in adjacent federal agencies
- **A Prime Contractor** on **2020 Census,** one of the largest (scale) and most complex mission critical cloud/cyber/data analytics integration projects within the federal government

Concurrent Web Respondents (Peak)	Mobile Census Enumerators	Regional & Local Census Offices	Business Systems	Application Components
600,000+	500,000+	254 / 20K Workers	52	285+

- **Integrated 52 mission-critical systems comprised of 200+ applications** operating in a hybrid hyper-converged data center and Amazon Web Service ("AWS") public facing GovCloud protected by a world class active cyber defense (ACD) solution. Also includes a VDI-based Office 365 solution supporting 40k+ users and MS Azure AD managing 350k+ mobile users

ML3

Achievements & Partnerships

Silver Microsoft Partner
Silver Data Analytics
Silver Application Development
Silver Data Platform

aws partner network
Advanced Consulting Partner
Public Sector Partner

ISO 9001:2015 BUREAU VERITAS Certification
ISO 27001 BUREAU VERITAS Certification

CMMIDEV/3
CMMISVC/3

#1 Bloomberg Government Government Cloud Support Services PROVIDER 2016-20

Washington Technology 2020 Top 100 Government Contractors, Federal Market
T-REX #41

TOP WORK PLACES 2020 The Washington Post

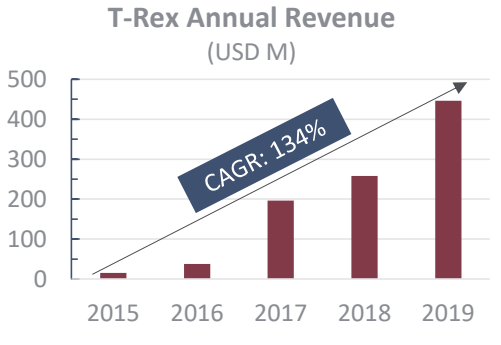
Company Info

- **Established:** 1999
- **Legal Structure:** LLC
- **Headquarters:** Greenbelt, MD
- **8(a)/HUBZone & SDVOSB Joint Ventures:** Ability to deliver services as a small business concern
- **Prime/**Sub (09/20): 98.5% Prime
- **Backlog** (09/20): $341.6MM

Prime Vehicles/BPAs:

- GSA Schedule 70
- USDA Cloud COE BPA
- Dept of Commerce ESF

Financial Summary



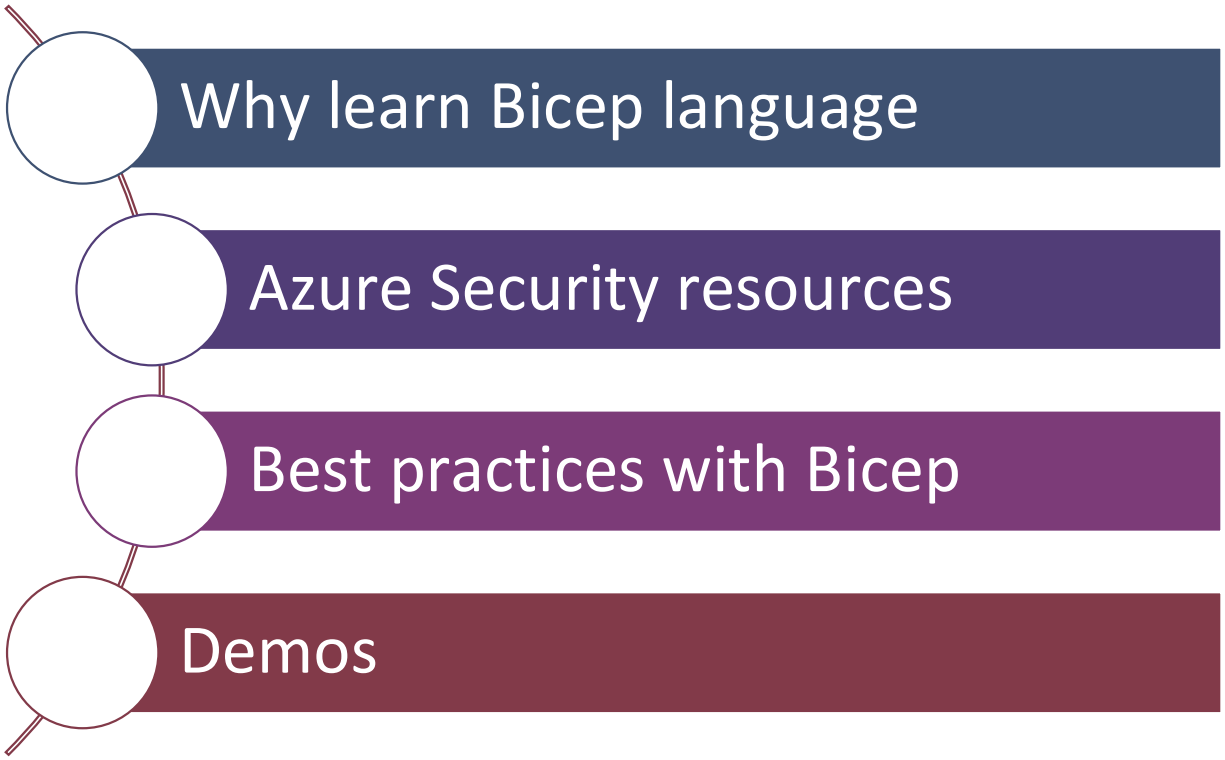
T-REX

Slide 3

ML3 1/05/21: Added MS Certs, note the specific three areas of certification are on the logo version that is off to the left pasteboard

Marnie Litz, 1/5/2021

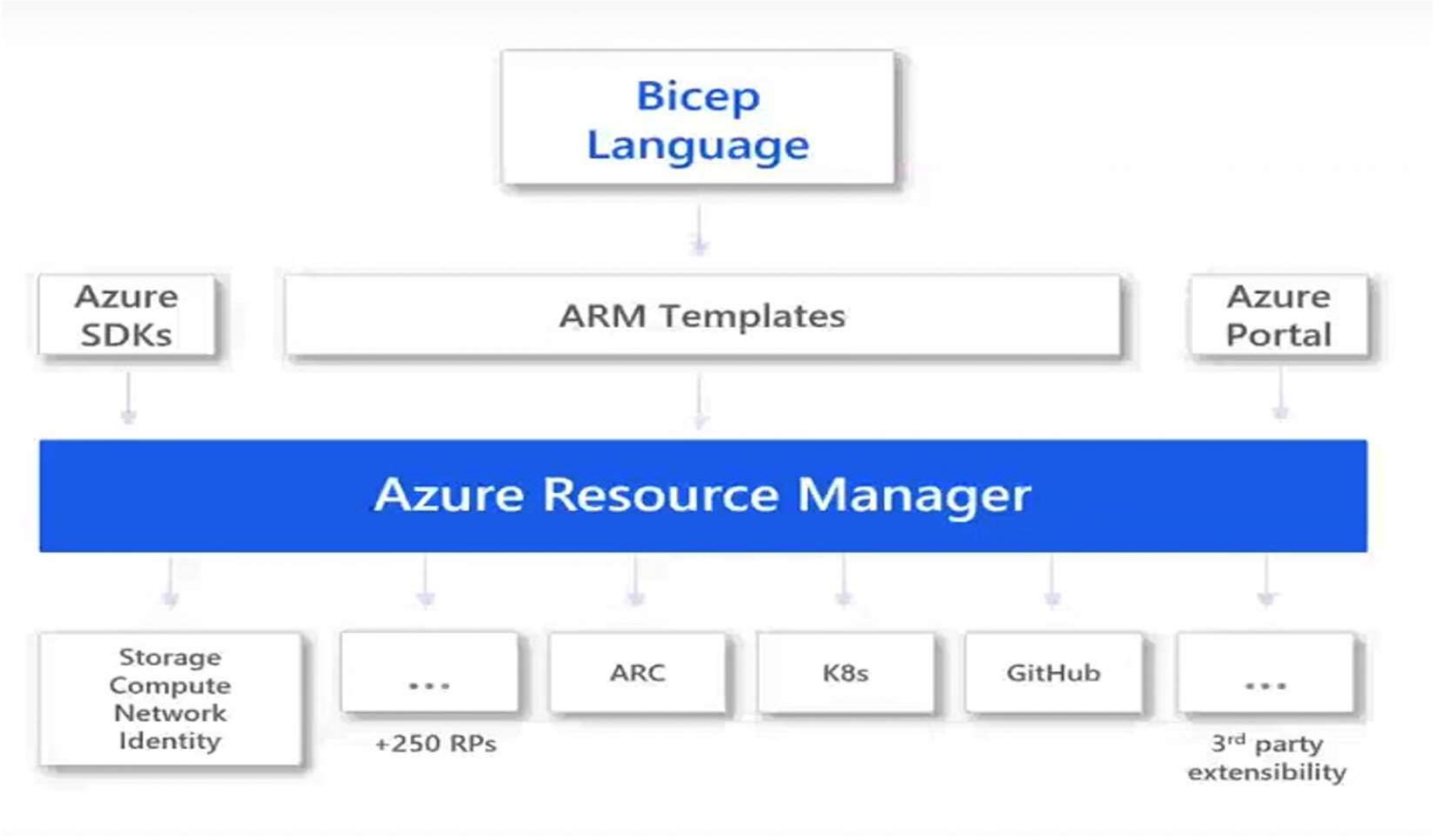
What we will cover



What is Azure Bicep?

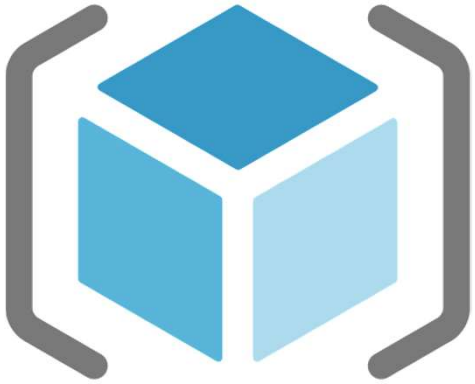
- DSL for deploying Azure resources
- Transparent abstraction over ARM and ARM templates
- Simple way to author Azure resources
- Transpiled to standard ARM Template JSON files

Relationship between Bicep and ARM templates



Why Bicep language?

- Easy to understand and maintain
- Day one support
- Transparent abstraction
- Awesome tooling in VS Code
- Clean code syntax
- Code re-use and modularity
- Deep integration with Azure
- Preflight validation
- No state management
- Production support



Azure Bicep evolution in 2021

- Started as alpha version in 2020
- Supported version: v0.3.1
- Latest version: v0.4.1008
- Expected version EOY: v0.5
- Stable version v1.0 by 2022

```
PS C:\Work\Learn-Bicep> az bicep list-versions
[
  "v0.4.1008",
  "v0.4.613",
  "v0.4.451",
  "v0.4.412",
  "v0.4.63",
  "v0.4.1",
  "v0.3.539",
  "v0.3.255",
  "v0.3.126",
  "v0.3.1",
  "v0.2.328",
  "v0.2.317",
  "v0.2.212",
  "v0.2.59",
  "v0.2.14",
  "v0.2.3",
  "v0.1.226-alpha",
  "v0.1.223-alpha",
  "v0.1.37-alpha",
  "v0.1.1-alpha"
]
```

How to start with Bicep?

- Install Azure PowerShell
- Install Azure CLI on Windows
- Install Azure CLI on Linux
- Install Azure CLI on macOS

Quick look into Bicep concepts

Parameters

samples > parameterized-storage.bicep > storageSKU

```bicep
// parameterized-storage.bicep
@minLength(3)
@maxLength(24)
param storageName string

@allowed([
  'Standard_LRS'
  'Standard_ZRS'
])
param storageSKU string = 'Standard_LRS'
```

Modules

```bicep
resource computeRg 'Microsoft.Resources/resourceGroups@2020-06-01' = {
  name: concat('bicep-azglobal-compute-v1-', azureRegion)
  location: azureRegion
}

var computeDeployment = 'vmLinuxDeploy'
var uniqueComputeDeployment = '${computeDeployment}${uniqueString(computeRg.id)}'

module vmWinMod './linux-vm.bicep' = {
  name: uniqueComputeDeployment
  scope: resourceGroup(computeRg.name)
  params: {
    adminUsername: 'azureuser'
    vmSize: 'Standard_B2s'
    vmName: 'myLinuxVm'
  }
}

resource databaseRg 'Microsoft.Resources/resourceGroups@2020-06-01' = {
  name: concat('bicep-azglobal-database-v1-', azureRegion)
  location: azureRegion
```

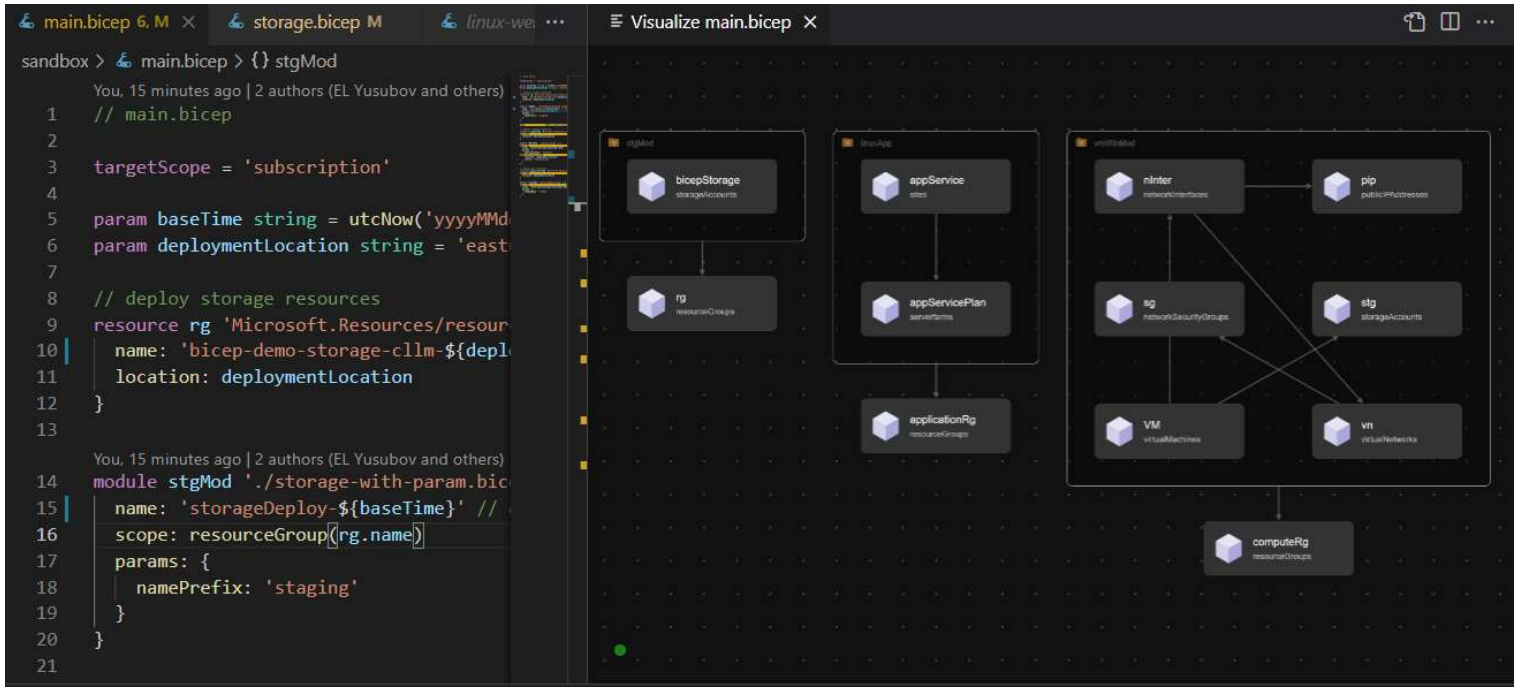
Template function and Variables

```bicep
param azureRegion string = resourceGroup().location

var uniqueStorageName = '${storageName}${uniqueString(resourceGroup().id)}'
```

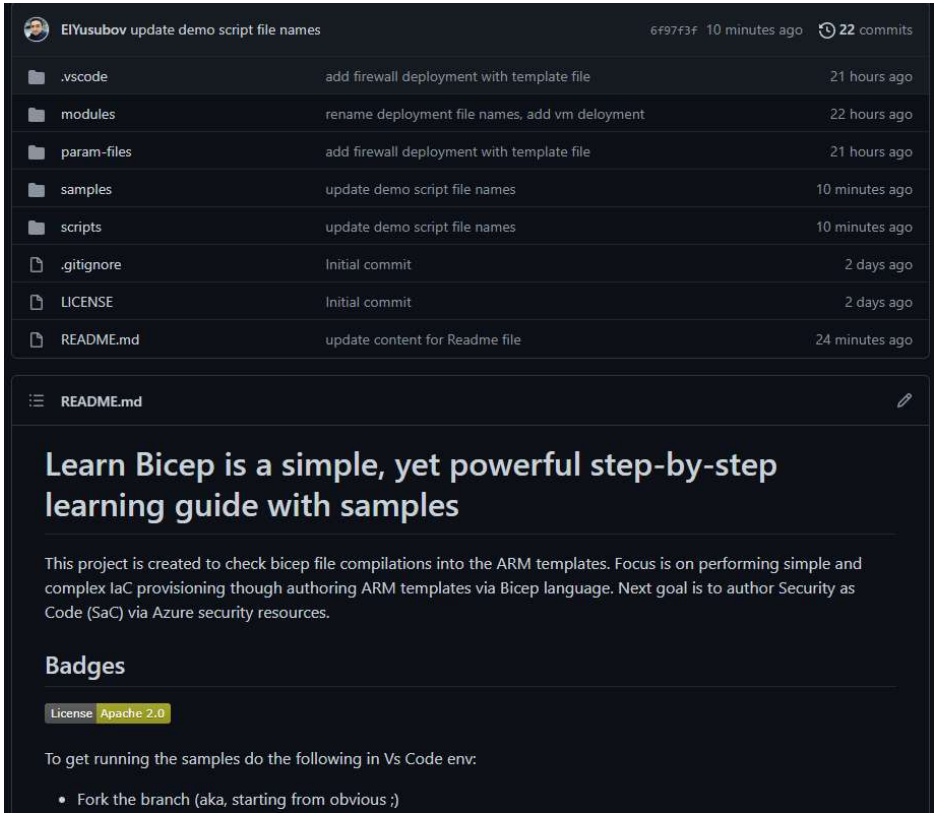
Bicep file visualizer

Visualized Bicep file resources



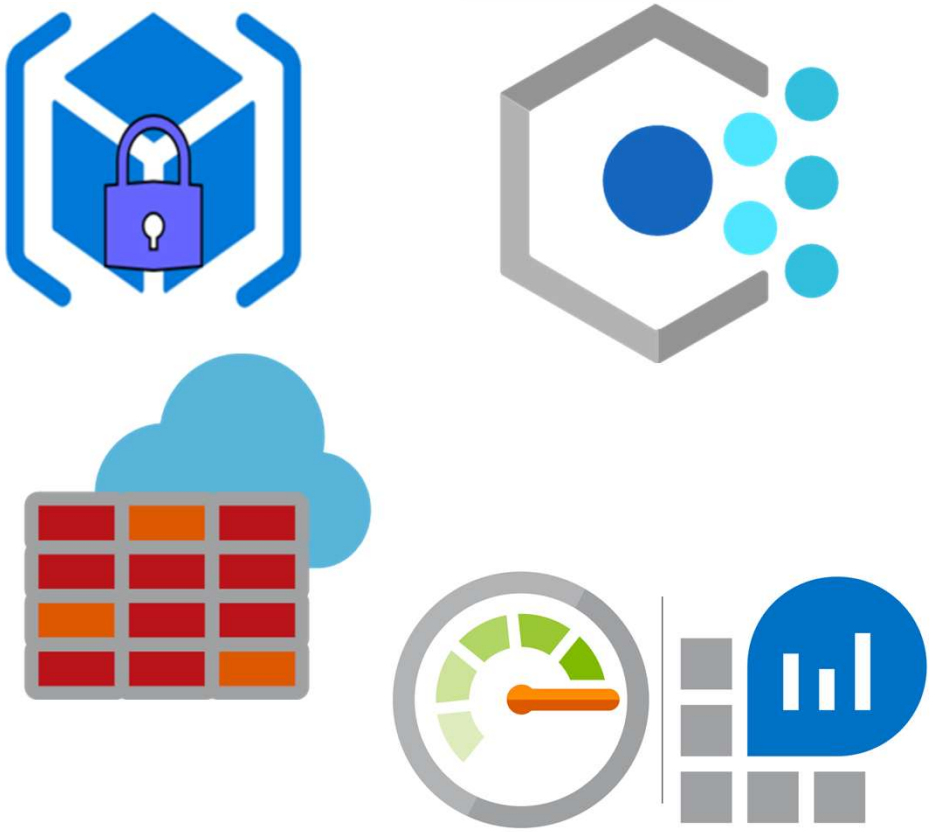
Demo 1 – Azure Bicep on VS Code

Quick starter Azure Bicep demo repo



Azure Security resources

- Resource locks
- Azure Policy
- Azure Firewall
- Data protection
- Security Monitoring
- Network Security
- Logging and auditing, etc.



Demo 2 – Defining security policies

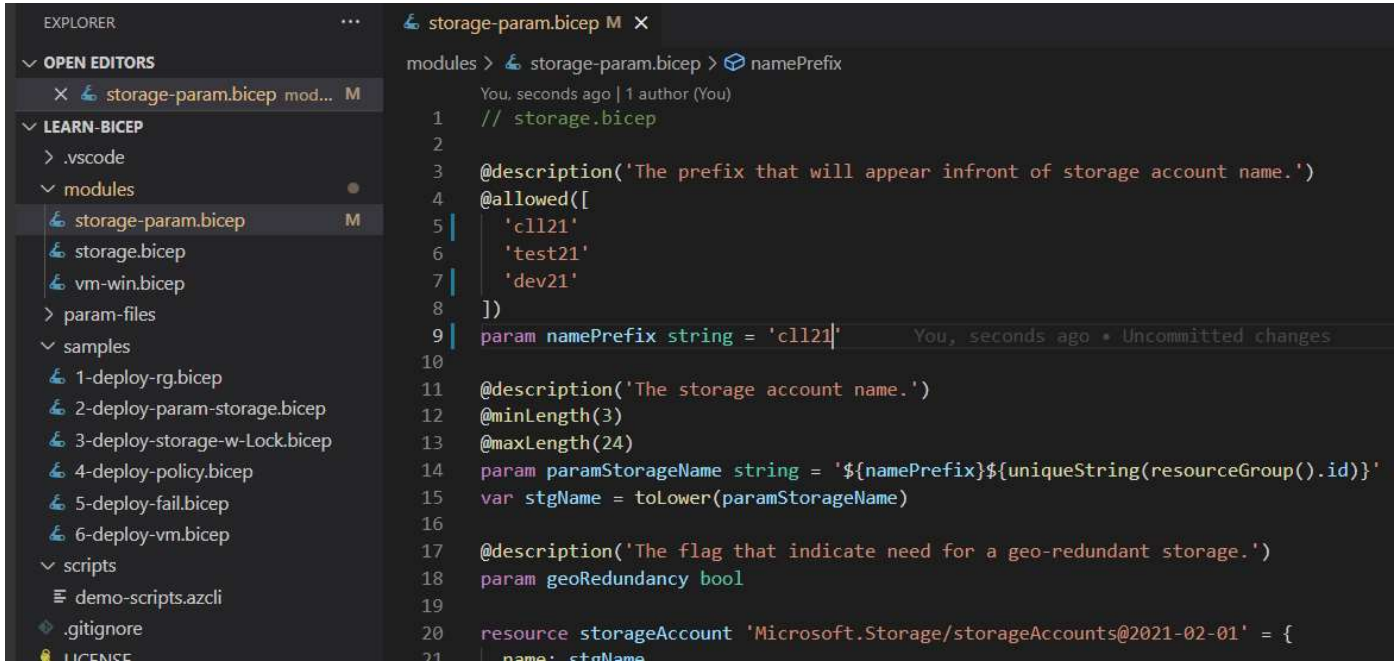
Deploying the security definitions, policies and locks

```
TERMINAL  DEBUG CONSOLE  PROBLEMS  OUTPUT

PS C:\Work\Bicep-Starter> az deployment sub create --location eastus2 --template-file .\samples\custom-locations.bicep
The system cannot find the path specified.
Please provide string value for 'policyEffect' (? for help):
 [1] Audit
 [2] Deny
Please enter a choice [Default choice(1)]: 2
{
  "id": "/subscriptions/751fab54-447d-4b8f-8d44-12172466e856/providers/Microsoft.Resources/deployments/custom-locations",
  "location": "eastus2",
  "name": "custom-locations",
  "properties": {
    "correlationId": "df1bc4a1-f8d2-4320-8606-ec9a7d2135db",
    "debugSetting": null,
    "dependencies": [
      {
        "dependsOn": [
          {
            "id": "/subscriptions/751fab54-447d-4b8f-8d44-12172466e856/providers/Microsoft.Authorization/policyDefinitions/c
            "resourceName": "custom-allowed-location",
            "resourceType": "Microsoft.Authorization/policyDefinitions"
          }
        ],
        "id": "/subscriptions/751fab54-447d-4b8f-8d44-12172466e856/providers/Microsoft.Authorization/policyAssignments/Resou
        "resourceName": "Resource-location-restriction",
        "resourceType": "Microsoft.Authorization/policyAssignments"
      }
    ],
    "duration": "PT1.6436266S"
```

Demo 3 – Real world deployment scenarios

Modular deployment, parameterization & decompile

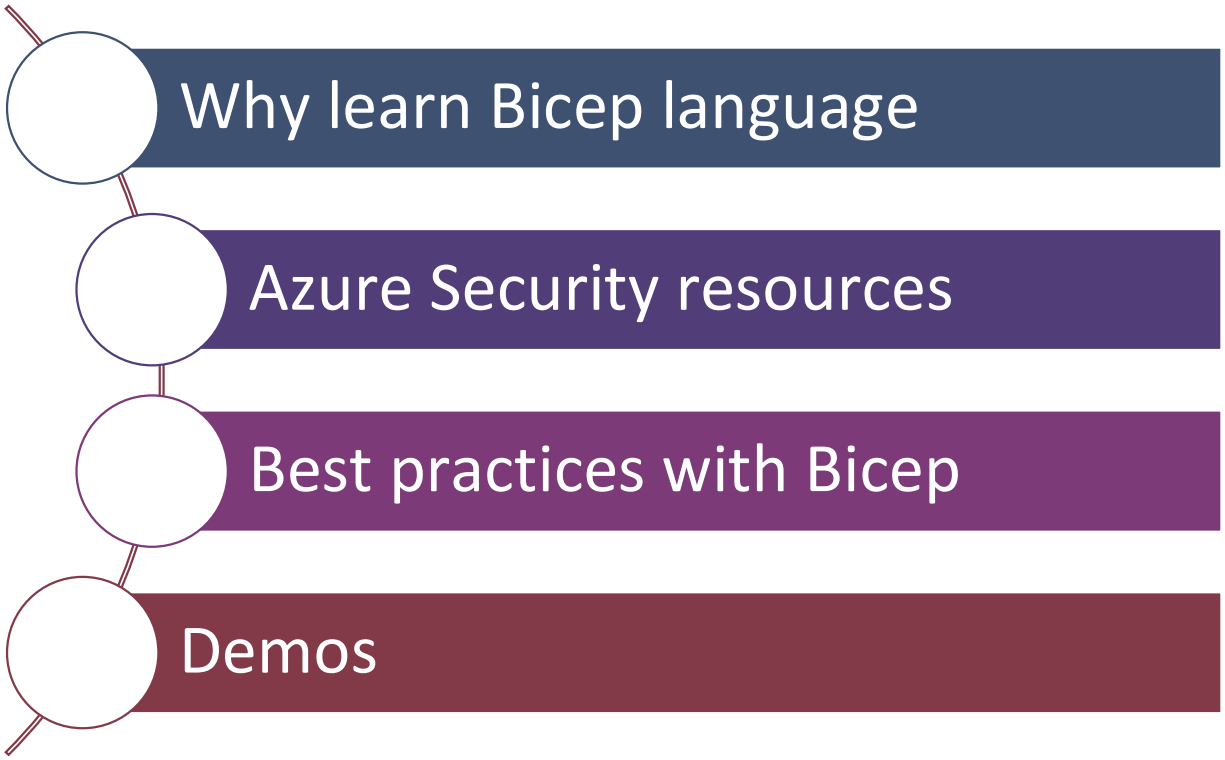


Demo 4 – Azure Key Vault integration

Securing and managing sensitive information

```
21
22  resource kv 'Microsoft.KeyVault/vaults@2019-09-01' existing = {
23    name: kvName
24    scope: resourceGroup(subscriptionId, kvResourceGroup )
25  }
26
    You, 6 minutes ago | 1 author (You)
27  module sql '../modules/sqldb.bicep' = {
28    name: 'deploySQL'
29    params: {
30      sqlServerName: sqlServerName
31      location: 'eastus2'
32      adminLogin: adminLogin
33      adminPassword: kv.getSecret('ExamplePassword')
34    }
35  }
36
```

What we will cover



What is next?

Learn Bicep – GitHub

Let's Connect - LinkedIn

Bicep project on GitHub

Tutorial on Azure Bicep

T-REX

Q & A

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Thank you!

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