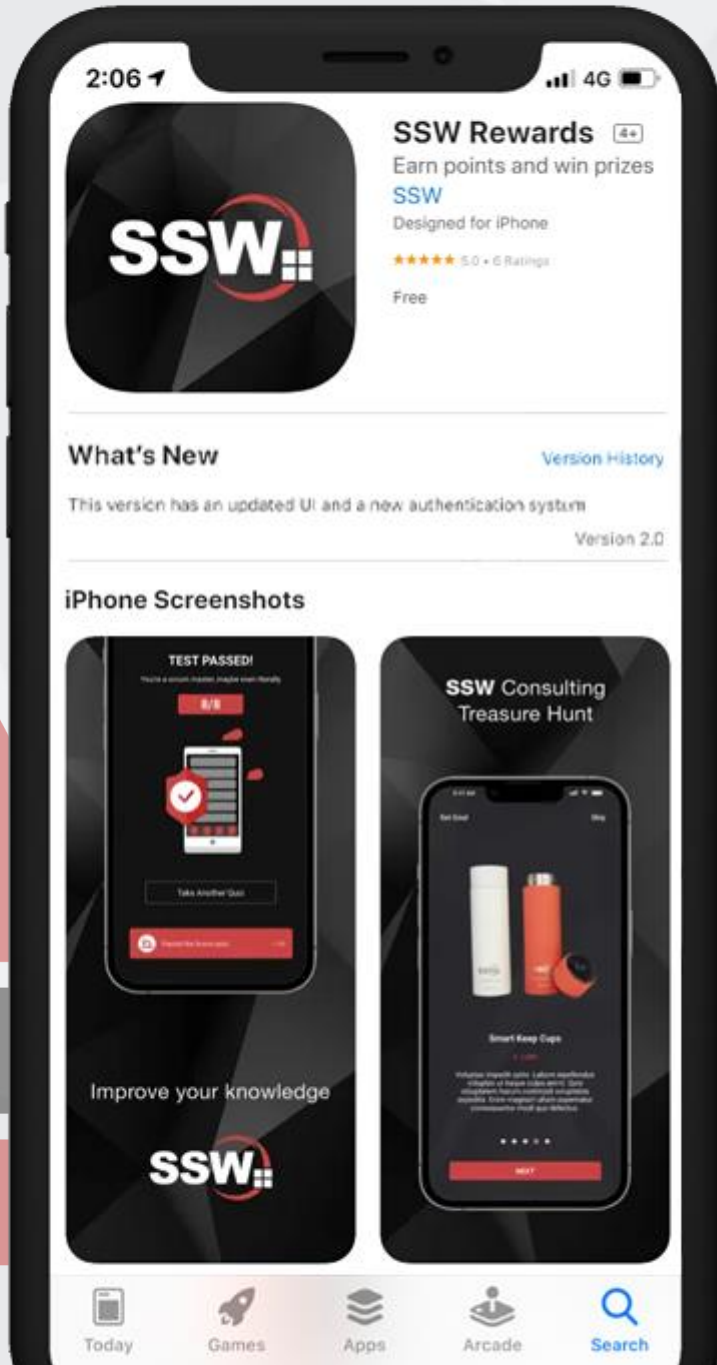
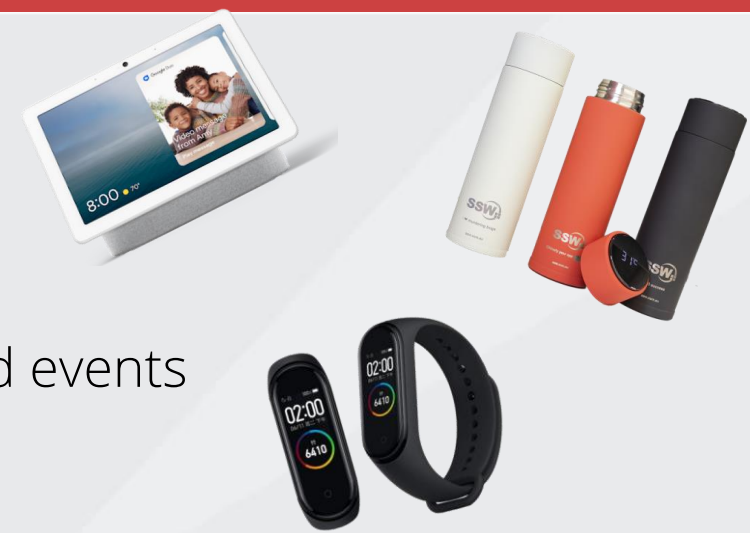




Enterprise Software Development



1. Scan QR Code to install app
2. Scan SSW codes at talks and events
3. Earn **SSW Points** ★
claim rewards, and win prizes



Join the Conversation | #NETUG | @William_DotNET

A black and white photograph of a man with a beard and short hair, wearing dark swim trunks, standing in a waterfall. He is flexing both of his biceps with a determined expression. The water is cascading over him, creating a misty spray. The background is dark and rocky.

Flexing your Biceps with Azure

.NET User Group August 2022

Join the Conversation | @BicepLang | @William_DotNET | azuregems.io | #NETUG | #SSW_TV

Infrastructure as Code

- Automate resource provisioning
- Triggered by success of CI/CD processes
- Helps to manage cost, risk, and speed
- Cloud infrastructure is getting complicated...
- JSON, YAML, XML everywhere...
- We need to keep it sweet and short! (KISS principle)



William Liebenberg

Solution Architect at SSW



@William_DotNet



<https://azuregems.io>



[william-liebenberg](https://www.linkedin.com/in/william-liebenberg)

First program using BASIC on a Spectra Video 328

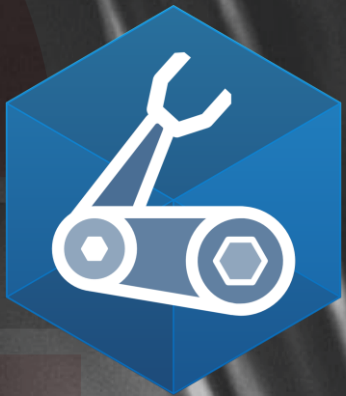
3D GameDev with C/C++ since 1999

.NET v2.0 since 2006

Azure since 2014



Agenda



What is Azure Bicep?

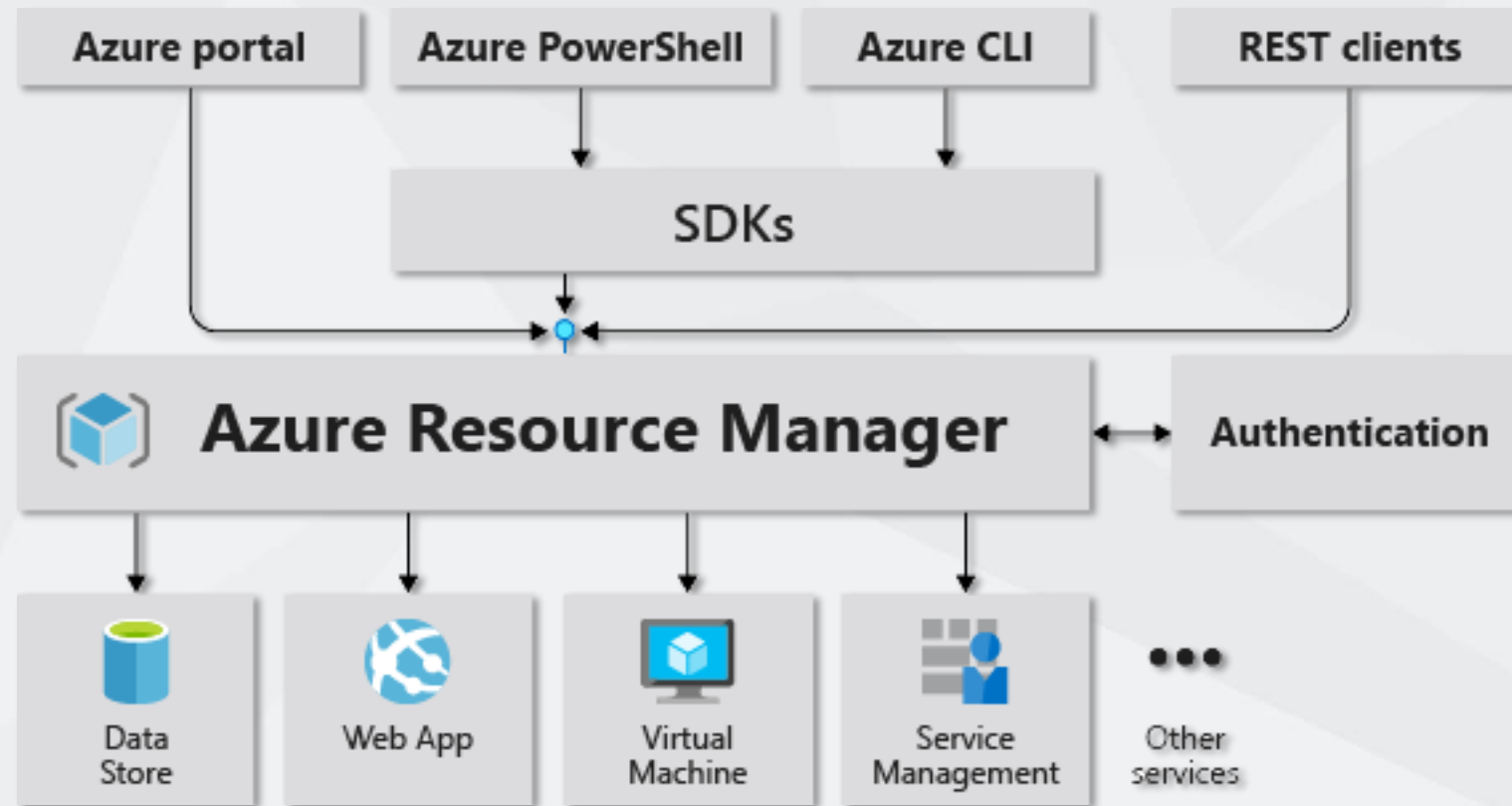
Comparisons with other IaC tools

How to Bicep

Module Registries

Demos... lots of demos!

Azure Resource Manager





Source: Microsoft Docs



What is Azure Bicep?

Domain Specific Language (DSL) that aims to:

- simplify authoring of templates (compared to JSON)
- increase modularity
- increase code reuse




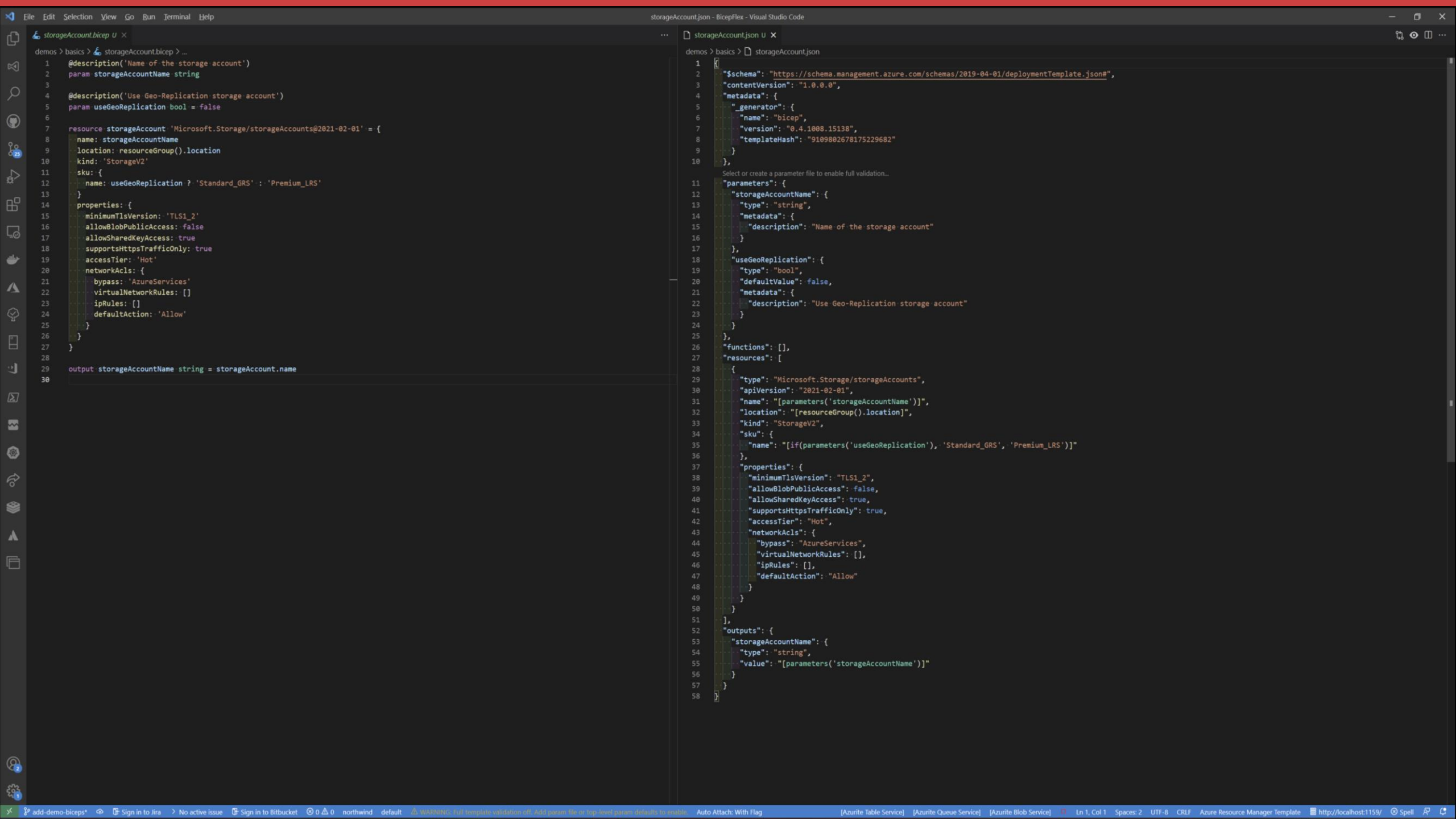
```
@description('Name of the storage account')
param storageAccountName string

@description('Use Geo-Replication storage account')
param useGeoReplication bool = false

resource storageAccount 'Microsoft.Storage/storageAccounts@2021-02-01' = {
  name: storageAccountName
  location: resourceGroup().location
  kind: 'StorageV2'
  sku: {
    name: useGeoReplication ? 'Standard_GRS' : 'Premium_LRS'
  }
  properties: {
    minimumTlsVersion: 'TLS1_2'
    allowBlobPublicAccess: false
    allowSharedKeyAccess: true
    supportsHttpsTrafficOnly: true
    accessTier: 'Hot'
    networkAcls: {
      bypass: 'AzureServices'
      virtualNetworkRules: []
      ipRules: []
      defaultAction: 'Allow'
    }
  }
}

output storageAccountName string = storageAccount.name
```







What is Azure Bicep?

2 types of ARM templates:

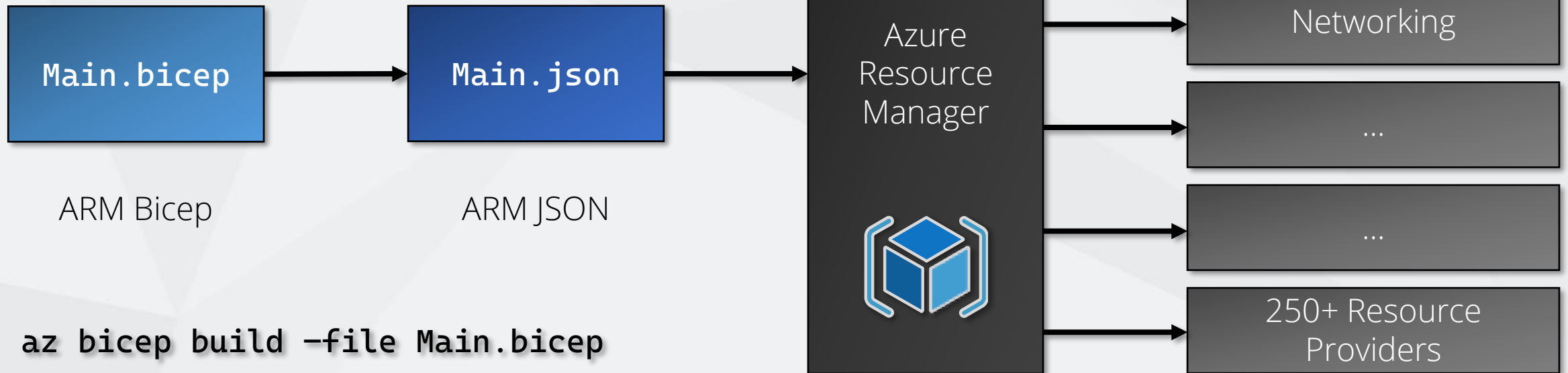
- JSON
- Bicep

Both translate into SDK/REST calls to Azure Resource Manager (ARM) to provision resources



What is Azure Bicep?

```
az deployment group create `
  --resource-group MyResourceGroup `
  --template-file Main.bicep
```



```
az bicep build -file Main.bicep
```



Demo 1

The Basics





Limitations of Azure Bicep

- Bicep is NOT a Configuration Management Tool
- Once resources are provisioned... **That's it!**
- Does not deploy data/software onto resources

* Chef, Puppet, SaltStack and Ansible are Configuration Management Tools

Agenda

What is Azure Bicep?




Comparisons with other IaC tools

How to Bicep

DevOps with Azure Bicep

Module Registries



	 Azure Bicep	 Terraform	 Pulumi
State Management	Live-state	Self Managed + SaaS option	Managed by Pulumi + Self-serve
Style	Strict/Declarative	Strict/Declarative	Flexible/Imperative
Language	Bicep (DSL)	HCL (DSL)	C#, F#, JavaScript, TypeScript, Go, Python
Free	Yes	Yes + Paid offering	Yes + Paid offering
Project Management	Modules	Modules	Monolithic / Micro projects
Multi-cloud	No	Yes	Yes
Support	Microsoft	Hashicorp	Pulumi
Open Source	MIT License	Apache License 2.0	Mozilla PL 2.0
Learning Curve	Low	Med	Med

Agenda

What is Azure Bicep?

Comparisons with other IaC tools

How to Bicep

DevOps with Azure Bicep

Module Registries



How to Bicep

- Install the tools
 - Azure CLI (or Azure PowerShell)
 - VS Code Extension
- Azure DevOps Pipelines
- GitHub Workflows

```
az bicep install  
az bicep upgrade
```



Demo 2

How to Bicep 😊



Agenda

What is Azure Bicep?

Comparisons with other IaC tools

How to Bicep

DevOps with Azure Bicep

Module Registries

GitHub Actions – Bicep Lint



```
jobs:
```

```
  Lint:
```

```
    name: Check best practices (Bicep Linter)
```

```
    runs-on: ubuntu-latest
```

```
    steps:
```

```
      - uses: actions/checkout@v2
```

```
      - shell: pwsh
```

```
        run: |
```

```
          az bicep build --file .azure/azureDeploy.bicep
```

GitHub Actions – Bicep Validate



```
jobs:
  Validate:
    name: Validate resources
    runs-on: ubuntu-latest
    steps:
      - uses: azure/login@v1
        with:
          creds: ${ secrets.AZURE_CREDENTIALS }
      - uses: actions/checkout@v2
      - name: Validate Bicep
        shell: pwsh
        run: |
          az deployment group validate `
            -g ${ env.AZURE_RESOURCEGROUP_NAME } `
            --template-file .azure/azureDeploy.bicep `
            --parameters .azure/parameters.json
```

GitHub Actions – Bicep What-If



```
jobs:
  PreviewInfra:
    name: Preview changes (What-if)
    runs-on: ubuntu-latest
    needs: [Lint, Validate]
    steps:
      - uses: azure/login@v1
        with:
          creds: ${ secrets.AZURE_CREDENTIALS }
      - uses: actions/checkout@v2
      - name: Run what-if
        shell: pwsh
        run: |
          az deployment group what-if `
            -g ${ env.AZURE_RESOURCEGROUP_NAME } `
            --template-file .azure/azureDeploy.bicep `
            --parameters .azure/parameters.json
```

GitHub Actions – Bicep Deploy



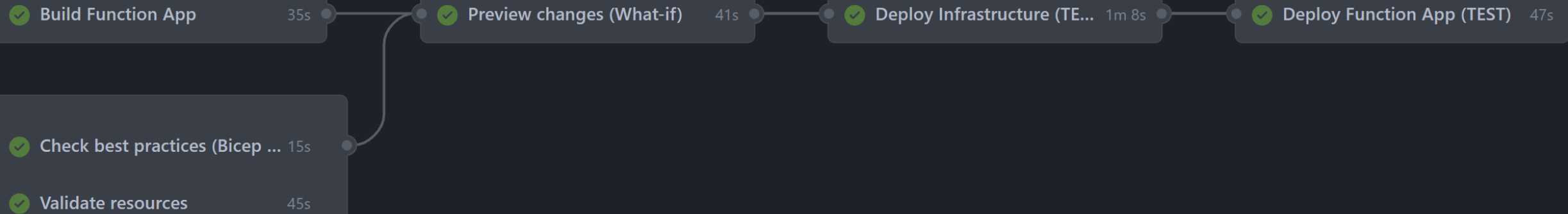
```
jobs:
  Deploy:
    runs-on: ubuntu-latest
    needs: [PreviewInfra]
    outputs:
      funcAppName: ${ steps.deploy.outputs.functionAppName }
      storageAccountName: ${ steps.deploy.outputs.storageAccountName }
    steps:
      /* ... Checkout and Log into azure ... */
      - name: Deploy to Test resource group
        id: deploy
        shell: pwsh
        run: |
          $outputs = (az deployment group create -g ${ env.AZURE_RESOURCEGROUP_NAME } `
            --mode Incremental `
            --template-file .azure/azureDeploy.bicep `
            --parameters .azure/parameters.json --query properties.outputs) | ConvertFrom-Json

          Write-Output "::set-output name=functionAppName::${$outputs.functionAppName.value}"
          Write-Output "::set-output name=storageAccountName::${$outputs.storageAccountName.value}"
```

GitHub Actions – Bicep Deploy



ci.yml
on: push



Agenda

What is Azure Bicep?

Comparisons with other IaC tools

How to Bicep

DevOps with Azure Bicep

Module Registries



Private Registry

- Reference modules from
Azure Container Registry (ACR)
- Encapsulate and reuse complex infrastructure
- Tagging (versioning)



Public Registry

- <https://github.com/Azure/bicep-registry-modules#bicep-registry-modules>

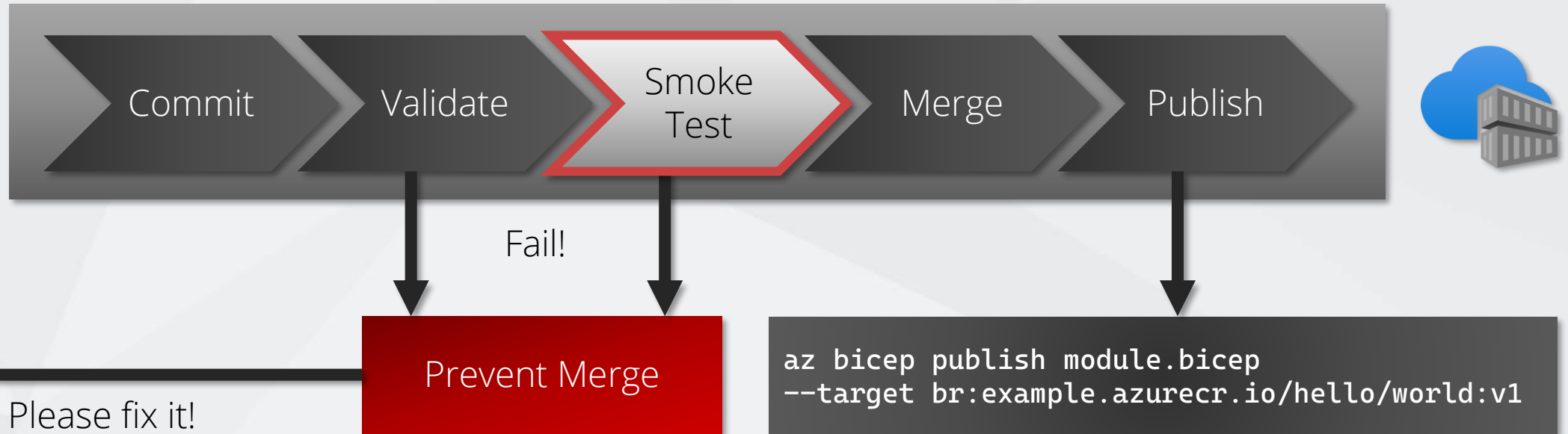
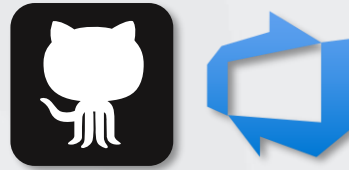
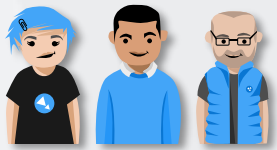


Demo 3

Modules and Registries



DevOps with Bicep Module Registries



Pros and Cons

- ✓ No managed state
- ✓ Simpler syntax
- ✓ Code Reuse
- ✓ Scoping (RG, Subscription, Tenant)
- ✓ Preventing output of secure values
- ✓ Module Registries
- ✓ Day-0 support from Microsoft
- ✓ Decompile ARM JSON into Bicep 😊
- ✗ Live-state (What-if) can be inaccurate
- ✗ Visualizer can't deal with modules
- ✗ No User Defined Functions (UDFs)
- ✗ No resource provider aliases
- ✗ Parameter file is still JSON!
- ✗ Listing Keys are inconsistent
- ✗ Discoverability via Docs (like TF Docs)

Links

Slides and Code: <https://github.com/william-liebenberg/BicepFlex>

[Azure Bicep on GitHub](#)

[Bicep Best Practices on MS Docs](#)

[MS Learn Bicep Module](#)

[Azure Architecture Center](#)

[Azure Quickstart templates repo](#)

[Bicep Playground](#)

Summary

- Bicep is KISS by design
- Improved programming syntax
- Code reusability is high and saves a lot of time
- Module Registries are great
- There is more coming (we're not even at v1.0 yet!)
- Writing Infra-as-Code is fun again!

Thank you!



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William Liebenberg

Flexing Your Biceps with Azure



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