Deploying to Azure Using Terraform

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Agenda

High level Azure deployment methods

Template based deployments

Terraform based deployment

Methods for deploying stuff in Azure

Three over-arching methods.

- Azure Portal (manual)
- Scripts / SDKs (automation)
- Template based deployments (automation)

Methods for Azure resource deployments

Azure Portal (manual)

Pros:

- Browser based, quick setup, no fuss
- Nice for exploration and visual inspection
- Fully featured

Cons:

- Everything is performed manually
- Error prone
- Lack of process integration (DevOps, ITSM)

Methods for Azure resource deployments

Scripts / SDKs (automation)

Pros:

- Process integration (DevOps / ITSM)
- Removes human / less error prone
- Unopinionated / total flexibility

Cons:

- Requires scripting knowledge / environment
- Complex logic needs to be hand built

Methods for Azure resource deployments

Template based deployments (automation)

Pros:

- Process integration (DevOps / ITSM)
- Removes human / less error prone
- Handles some complex logic
- Options for state management

Cons:

- Requires templating knowledge / environment
- Opinionated and lack of full flexibility

Template based deployments

Digging deeper on template based deployments.

- Azure Resource Manager templates or Terraform
- Declaration of desired infrastructure
- JSON or JSON like syntax
- Deploy, update, delete

Azure Resource Manager Templates

What are Azure Resource Manager Templates?

- Written in JSON
- Tooling for Visual Studio and Visual Studio Code
- Native Azure portal integration
- Generated directly from REST / Swagger

Azure Resource Manager Template Example

```
{
    "$schema": "https://schema.management.azure.com/..json#",
    "contentVersion": "1.0.0.0",
    "parameters": {},
    "variables": {},
    "resources": [{
            "type": "Microsoft.Resources/resourceGroups",
            "apiVersion": "2018-05-01",
            "location": "eastus",
            "name": "demo-storage",
            "properties": {}
        },
        {
            "type": "Microsoft.Storage/storageAccounts",
            "name": "demo-storage",
            "apiVersion": "2018-02-01",
            "location": "eastus",
            "sku": {
                "name": "Standard_LRS"
            },
            "kind": "Storage",
            "properties": {}
        }
    ]
}
```

Resource Group

Storage Account

Terraform

What is Terraform?

- Open source project
- Cross computing environment templating language
- Provision, Update, and Delete resources
- Authored in HashiCorp Configuration Language (HCL) or JSON

Terraform Example

```
resource "azurerm_resource_group" "testrg" {
    name = "resourceGroupName"
    location = "westus"
}

resource "azurerm_storage_account" "testsa" {
    name = "storageaccountname"
    resource_group_name = "testrg"
    location = "westus"
    account_tier = "Standard"
    account_replication_type = "GRS"
}
```

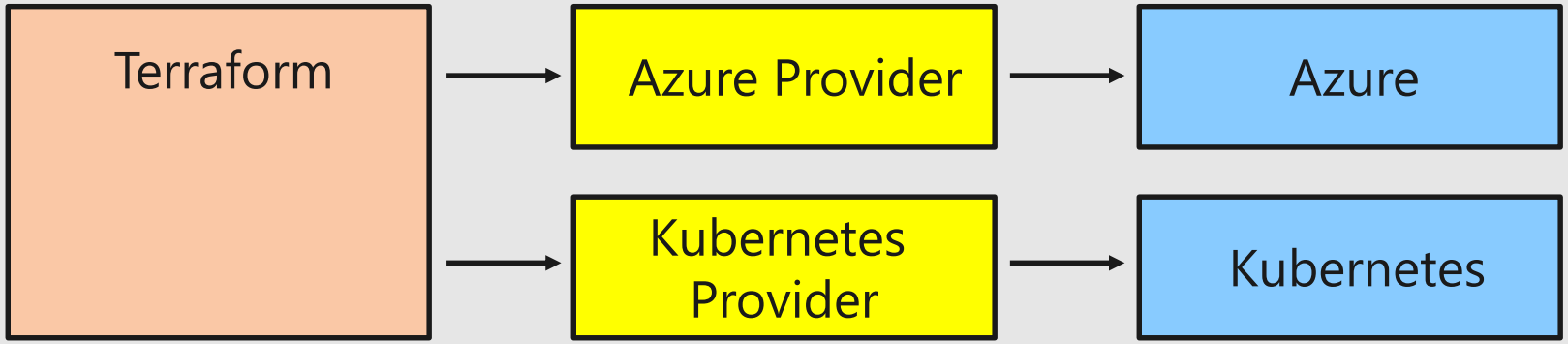
Resource Group

Storage Account

Providers

What is a Terraform provider?

- Terraform ‘extensions’ for deploying resources
- Manages cloud / endpoint specific API interactions
- Available for major clouds and other platforms
- Hand authored (azurerm)



Basic resource creation

Deployment foundations.

- Resource Type: required provider
- Name: internal name
- Configuration: deployment details

Resource Type

Name

```
resource "azurerm_resource_group" "demo-rg" {
    name = "demo-rg"
    location = "westus"
}
```

Resource Configuration

Basic Terraform commands

Once we have authored, how do we deploy?

- Terraform init – initializes working directory
- Terraform plan – pre-flight validation
- Terraform apply – deploys and updates resources
- Terraform destroy – removes all resources defined in a configuration

Variables and output

- Input variables: parameters for Terraform modules
- Environment variables: TF_VAR_azureclientid
- Output: Displayed and retrieved from state

```
$ TF_VAR_azureclientid = “00000000-0000-0000-0000-000000000000”

variable “azureclientid” {}
```

String Interpolation

Interpolation: the insertion of something of a different nature into something else.

- Variables
- Other resources
- Functions: ${count.index + 1}
- Others (Docs)

```
resource "azurerm_container_group" "demo-aci" {
    name = "demo-aci"
    location = "${azurerm_resource_group.demo-rg.location"
}
```

from resource

Dependencies

How are resource dependencies managed?

- Implicit – derived from interpolation
- Explicit – hard coded / explicit dependency

```
resource "azurerm_container_group" "demo-aci” {
    name = “demo-aci”

    depends_on = [“azure_cosmosdb_account.vote-db”]
}
```

State / Backend

What is Terraform state and why store it remotely?

Issues with local state:

- No collaboration
- Easy to delete / loose
- State files include secrets

Alternative:

- Store state in a backend (Azure Storage)

Data Sources

What is a Terraform data source?

- External data source for Terraform configuration
- Uses a provider just like in resource creation

Data Source Provider

Name

```
data "terraform_remote_state" "azurerm" {
    <configuration goes here>
}
```

```
"${data.terraform_remote_state.azurerm.resource-group}"
```

Automation and process integration

Once we are cooking, many opportunities for automation and process integration.

- Terraform Backends
- Environment variables
- GitHub
- Web Hooks
- Azure DevOps
- Etc.